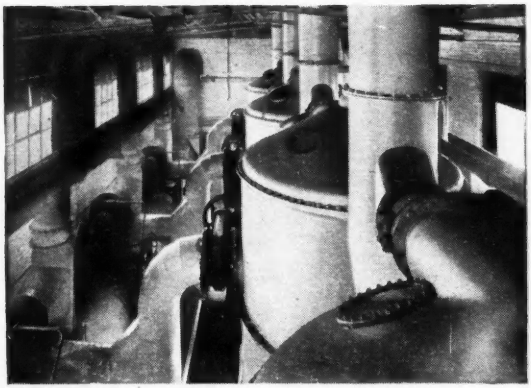
TECHNOLOGY DEPARTMENT

The
CHEMICAL AGE

VOL LX | 12 FEBRUARY 1949 | No 1544

PUBLIC LIBRARY
MAR 1 - 1949
DETROIT

Solvent ACTICARBONE Recovery



PLANT : Solvent Recovery, Drying of Gases, Distillation, Electrostatic Precipitators.

PRODUCTS : Activated Carbons, Filter Aids, Activated Earths, Bentonite, Kieselguhr.

CECA

THE BRITISH CECA COMPANY LTD.
175, PICCADILLY, LONDON, W.1. *Telephone : Regent 0856 (3 lines)*
CABLES : ACTICARBON, PICCY, LONDON

IMPORTERS and EXPORTERS

Specialising in

INDUSTRIAL and FINE CHEMICALS, DRUGS, SOLVENTS, PLASTICS, and all materials for manufacturing industries throughout Australia and New Zealand.

SWIFT

& COMPANY PTY. LTD.

Head Office: 26/30 Clarence St., Sydney, N.S.W.

Branches at: Melbourne, Adelaide, Perth, Brisbane, Australia, and Wellington, N.Z.

Cable Address: "Swift, Sydney."

Bankers: Bank of New South Wales, Sydney and London.

GUELPH CASKS

THE GUELPH CASK, VENEER & PLYWOOD CO., LTD.

West Ferry Road,
MILLWALL - LONDON, E. 14
Telephone : East 1489
Also at :
Manchester, England ; Scotstown, Quebec ; and Mattawa, Ontario, Canada.

CHEMICAL CORROSION

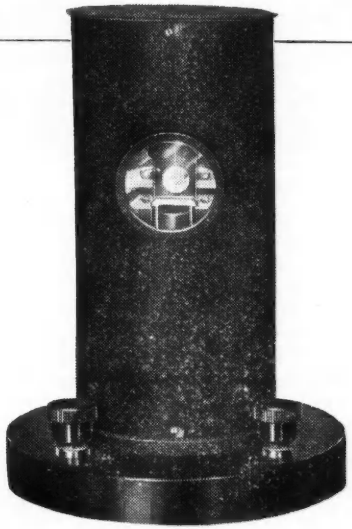
Protection against acid and alkaline attack to all surfaces under severe conditions.

Tretol Ltd., 12-14 North End Road, London, N.W.11
Tel. Spe 4621

TRETOL
CHLORINATED RUBBER PAINT

If it's—
ENGINEERING SUPPLIES
your
best chance is with
W. & C. TIPPLE
Phone : ALBert Dock 3111.
W. & C. TIPPLE, LTD.
HALLSVILLE RD., LONDON, E.16

GALVANOMETER
TYPE D-41-A



★ An extremely robust moving coil reflecting Galvanometer with interchangeable suspension piece.

★ The taut suspension and perfectly balanced coil make special mounting and levelling devices unnecessary.

★ Ideal for marine use, in mobile testing units, etc.

★ Spare suspensions and suspensions with other resistances and sensitivities can be supplied.

★ Standard Suspension:—

Sensitivity — 20 millimetres per microampere at 1 metre distance.
Coil resistance — 1,000 ohms.
Damping — Dead beat.

★ Overall dimensions:

Diameter of base	5½ in.
Height	7$\frac{25}{32}$ in.
Weight	6 lb.

A complete description is given in Bulletin B-513, a copy of which will gladly be sent on request.

MUIRHEAD

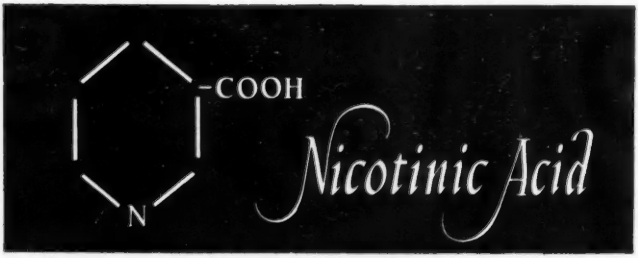
MUIRHEAD & COMPANY LIMITED

ELMERS END, BECKENHAM, KENT · TELEPHONE: BECKENHAM 0041-0042.

FOR OVER 60 YEARS DESIGNERS AND MAKERS OF PRECISION INSTRUMENTS

41

A



Nicotinic Acid is now in adequate supply

Trade Price List for Medical Specialities now available

Further information on request from

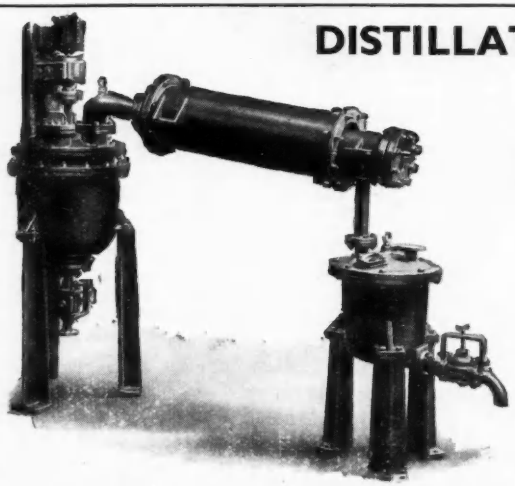
BOOTS PURE DRUG CO. LTD. NOTTINGHAM ENGLAND

Phone: Nottingham 45501

London Sales Office—71 Fleet St. London EC4 (Phone: Central 6901)

Visit our Stand No. B2, B.I.F. Olympia, May 2-13.

C-1



DISTILLATION PLANT

COMPRISING

MOTORISED MIXING STILL, DOUBLE SURFACE CONDENSER AND RECEIVER.

All internal surfaces lined with Hard Acid-Resisting Glass Enamel.

Established over a Century and a half

T. & C. CLARK & CO., LTD.

Telegrams: CLARK, WOLVERHAMPTON

WOLVERHAMPTON

Telephones: 20204/5

INDEX TO ADVERTISERS
IN THIS ISSUE

	Page
Accrington Brick & Tile Co., Ltd.	Cover iv
Audley Engineering Co., Ltd.	279
Berk, F. W., & Co., Ltd.	ix
Blackwell's Metallurgical Works, Ltd.	x
Blundells & T. Albert Crompton & Co., Ltd.	Cover iii
Boots Pure Drug Co., Ltd.	ii
British Carbo-Norit Union, Ltd.	280
British Ceca Co., Ltd., The	Front Cover
British Drug Houses, Ltd., The	xvi
British Gas Council, The	xii
British Thomson-Houston Co., Ltd., The	xiii
Brown & Co.	xxii
Cartwrights	x
Clark, T. & C., & Co., Ltd.	ii
Classified Advertisements	xviii, xix, xx, & xxi
Cole & Wilson, Ltd.	xxii
"Drum" Engineering Co., Ltd., The	Cover iii
E.C.D., Ltd.	viii
Evans, Adlard & Co., Ltd.	xxii
Evershed & Vignoles, Ltd.	vii
Farwig, J. F., & Co., Ltd.	vi
Foyle, W. & G., Ltd.	xxii
Gethings, B., & Son	Cover iii
Grazebrook, M. & W., Ltd.	xi
Greening, N., & Sons, Ltd.	iii
Guelph Cask, Veneer & Plywood Co., Ltd., The	Cover ii
Guest Industrials, Ltd.	277
Harris, Francis W., & Co., Ltd.	x
Harris (Lostock Gralam), Ltd.	Cover iii
Haughton's Metallic Co., Ltd.	x
Holland, B. A., Engineering Co., Ltd., The	iv
Imperial Typewriter Co., Ltd.	viii
Kestner Evaporator & Engineering Co., Ltd.	x & xiv
Leigh & Sons Metal Works	xxii
Leitch, John W., & Co., Ltd.	xiv
Lennox Foundry Co., Ltd.	xxii
Measuring & Scientific Equipment, Ltd.	xvii
Metafiltration Co., Ltd., The	xii
Muirhead & Co., Ltd.	i
National Enamels, Ltd.	xxi
Organic Dyestuffs, Ltd.	vi
Orr, Geo. W., & Co., Ltd.	xxi
Paget, Dr. R. F.	xix
Penrhyn Quarries	280
Perry & Hope, Ltd.	xxii
Porter, S., & Co., Ltd.	xvi
Quickfit & Quartz, Ltd.	xv
Roneo-Neopost, Ltd.	iv
Shell Chemicals, Ltd.	v
Staveley Iron & Chemical Co., Ltd., The	xi
Steel, J. M., & Co., Ltd.	xvii
Swift & Co., Pty., Ltd.	Cover ii
T. & T. Works, Ltd.	xxi
Timpson, William, Ltd.	xx
Tipple, W., & C., Ltd.	Cover i
Tretol, Ltd.	Cover i
Wilkinson, James, & Son, Ltd.	Cover iv
Wolters Balances, Ltd.	vi
Wood & Fairweather	xxii

GREENINGS of HAYES MIDDLESEX

N. GREENING & SONS LTD.,

Telephone: HAYES 3961

TEST SIEVES

B.S.S I.M.M. COMMERCIAL

WIRE BASKETS
CAGES TRAYS

And all forms of WIRE WORK FOR LABORATORY USE

WOVEN WIRE

ALL MESHES AND METALS
LARGE STOCKS
BURNER GAUZES CUT TO SIZE

NG 160

SAVING MONEY-
by throwing the post-book away

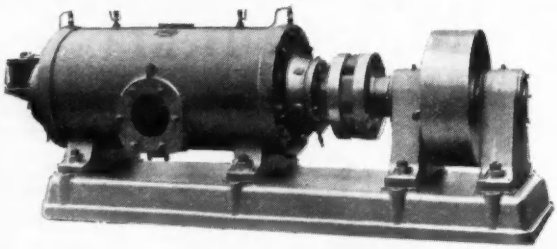
When a Neopost Franking machine comes into the office the post-book goes out and there's a look of relief on the face of the accountant. No more stamps to lose — because the Neopost prints its own. No more entries to check, because the Neopost keeps its own immaculate records! The Neopost gives complete security and speeds up the work of dealing with the post. It can show a real saving to any business which sends out even as few as 25 letters or parcels a day. Approved by the Postmaster-General. Send for particulars now.

neopost
FRANKING MACHINES

Eliminate postage stamps • Post early in the day — the Neopost way

RONEO-NEOPOST LTD • VICTORIA HOUSE • SOUTHAMPTON ROW • LONDON WC1

TBW



HOLLAND - S.L.M
Rotary Compressors and Vacuum Pumps

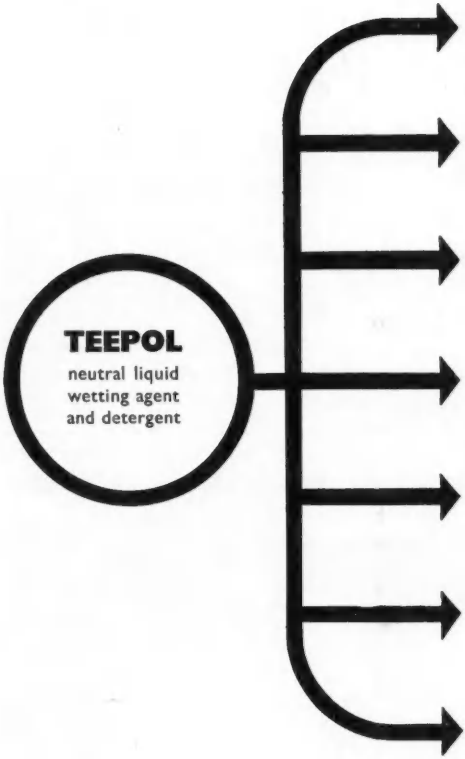
LOW MAINTENANCE COSTS : LONG LIFE
INITIAL EFFICIENCIES MAINTAINED
OVER YEARS OF SERVICE

The B.A. Holland Engineering Co. Ltd.

Works : Slough, Bucks.

Technical Office: LINDO LODGE, STANLEY AVENUE, CHESHAM, BUCKS. *Telephone: Chesham 406*

TEEPOL—an essential aid to process problems . . .



TEXTILES : Scouring, carbonising, anti-shrinking, bleaching, dyeing, finishing.

LEATHER & FUR TRADES : Soaking, scouring, pickling, stripping, wetting-back, fat-liquoring, dyeing.

LAUNDRIES : Washing all classifications, especially woollens, silks, rayons, coloured goods and all heavily soiled articles.

WORKS MAINTENANCE : Cleaning all types of plant and equipment in the factory, canteens, workshops.

PAINT MANUFACTURE : Stabilizing emulsion-based paints; wetting and dispersing pigments.

PAPER MAKING : Boiling and pulping straw, esparto, rags; bleaching, dyeing, sizing; cleaning wires, felts.

ENGINEERING : De-greasing, acid pickling and electro-plating.

Write for Technical Information Sheets regarding the detailed applications of "TEEPOL" (Regd. Trade Mark).

SHELL

Shell Chemicals Limited
(DISTRIBUTORS)

PG4

112, Strand, LONDON, W.C.2. *Telephone:* Temple Bar 4455

Manufacturers of

Aniline Colours and Pigments

Pattern Cards on Request

ORGANIC DYESTUFFS LIMITED

Pendleton Mills, Croft-st., Pendleton

Tele: Pendleton 1031
'Grams: "Fascolour, Manchester"

W W B

BALANCES OFF THE SHELF?

? ? ? ?

Not quite! but

Prompt deliveries . . .

. . . Balances & Weights

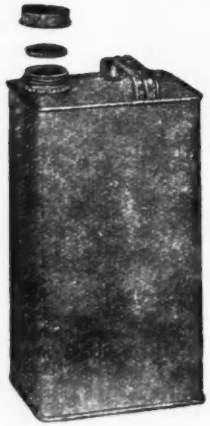
Repairs a Speciality

WOLTERS BALANCES LTD.

137 QUEEN'S ROAD, WATFORD, HERTS.

ESTABLISHED 1875

Tins for all Trades Home & Export



Square can showing patent screw neck.
Patent No. 382,380

CAPSULING MACHINE

NECK, PLUGS and CAPSULES for hermetically sealing cans holding liquids.

SPECIALISTS IN PRESS FITTINGS for all types of Cans and Drums
Contractors to the Admiralty, Ministry of Supply, India Office, Crown Agents for the Colonies, etc., etc.

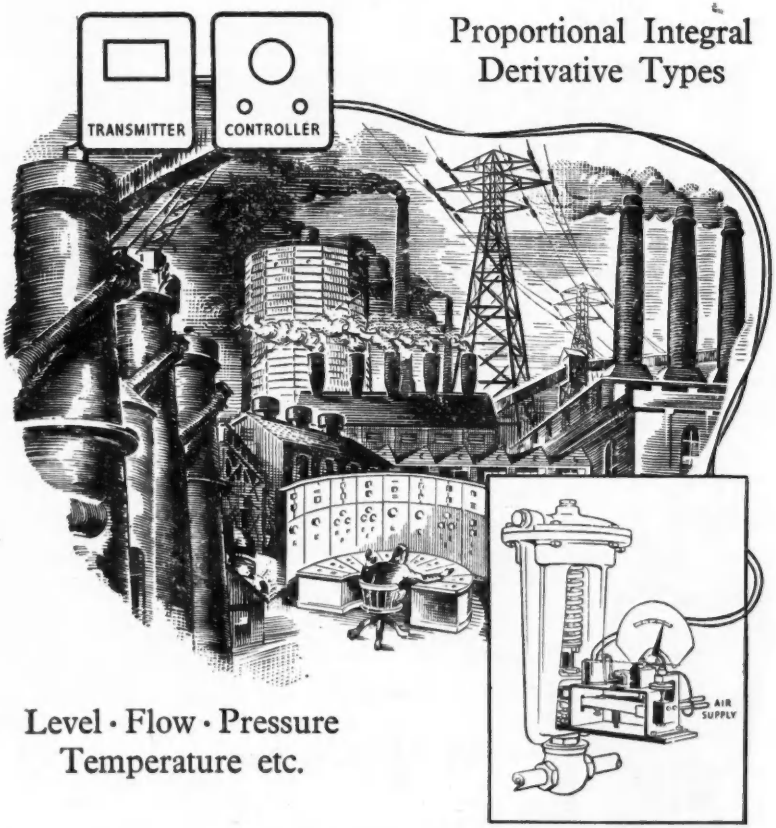
J. F. Farwig & Co LIMITED Est. 1809

208-214 YORK RD., BATTERSEA, LONDON, S.W.11
Grams: CALORIGEN, BATT, LONDON. Tel: Battersea 7008

For Chemical Works and Refineries

EVERSHED ELECTRO-PNEUMATIC PROCESS CONTROLLERS

Proportional Integral Derivative Types



Level · Flow · Pressure
Temperature etc.

Consult our Controls Department, quoting ref. C.H. 5/107

EVERSHED AND VIGNOLES LIMITED CHISWICK · LONDON · W4
Telephone: Chiswick 1370 · Telegrams: Megger Chisk, London : Cables: Megger London
In association with
GLENFIELD & KENNEDY LTD and THE BRITISH PITOMETER CO. LTD

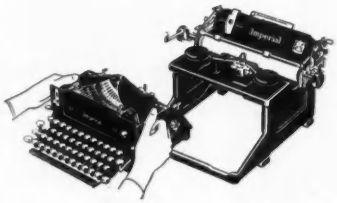
ΔΑΚΤΥΛΟΓΡΑΦΗΣΙΝ

The Greeks have a word for "TYPEWRITING." So have the Portuguese, the Burmese and the Cingalese. And wherever these languages—and many others—are used commercially, there is a great demand for Imperial Typewriters. No wonder we cannot supply as many machines for the home market as we would like.

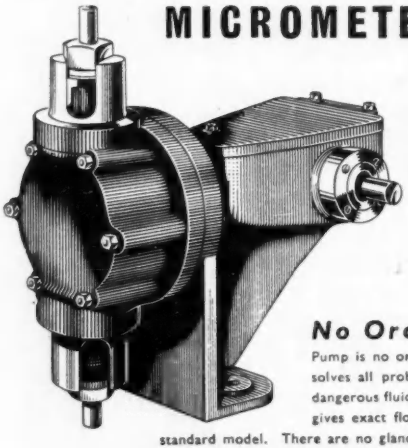
Imperial

The World's most versatile

Typewriter



Imperial Typewriter Co. Ltd., Leicester

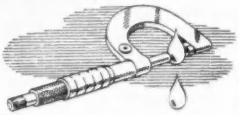


MICROMETER REGULATION

STANDARD MODEL

1/10 TO 40 GALLONS

LARGER MODELS AVAILABLE



No Ordinary Pump! This E.C.D. Injection Pump is no ordinary job. In one compact, slow-running unit it solves all problems of handling volatile, precious, corrosive, or dangerous fluids in accurate quantities. Simple Micro Adjustment gives exact flow rates from 1/10th to 40 gallons per hour with standard model. There are no glands to leak or wear and all working parts are oil-bath enclosed. Maximum working pressure of Standard Pump—150 lb. per square inch. Illustrated descriptive booklet on request.

E·C·D *Ltd* ENGINEERS

E·C·D LIMITED TONBRIDGE KENT TEL: TONBRIDGE 737

BERK CHEMICALS

Ask Berk

for

Acids

Chemicals

Drugs and Botanicals

Filter Aids, Bentonites and Zircon

Mercurials

Metal Powders

Protective Coatings

Phone: Chancery 6041 (12 lines)

F. W. BERK & Co., Ltd.

CHEMICAL MANUFACTURERS

COMMONWEALTH HOUSE, 1-19, NEW OXFORD ST., LONDON, W.C.1

Also at 81, FOUNTAIN STREET, MANCHESTER, 2

Works: Abbey Mills Chemical Works, Stratford, E.15.

BELTING
AND
ENDLESS VEE ROPES

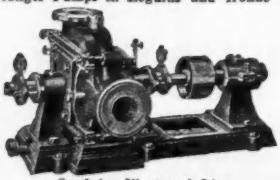
Superlative Quality
Large Stocks - Prompt Despatch

FRANCIS W. HARRIS & Co. Ltd.
BURSLEM - Stoke-on-Trent
'Phone : Stoke-on-Trent 87181-2
'Grams : Belting, Burslem

"LION BRAND"
METALS AND ALLOYS
MINERALS AND ORES
RUTILE, ILMENITE, ZIRCON,
MONAZITE, MANGANESE, Etc
BLACKWELL'S
METALLURGICAL WORKS LTD.
GARSTON, LIVERPOOL, 19
ESTABLISHED 1869

BLA 0849
Plumbing
CARTWRIGHTS
ENGINEERS & SURVEYORS
MANCHESTER 2.

For all kinds of Acid Lifting, Haughton's Centrifugal and Plunger Pumps in Regulus and Ironac Metal



Send for Illustrated List
HAUGHTON'S METALLIC CO. Ltd.
30, ST. MARY-AT-HILL, LONDON, E.C.3

KEEBUSH
Keebush is an acid-resisting constructional material used for the construction of tanks, pumps, pipes, valves, fans, etc. It is completely inert to most commercial acids ; is unaffected by temperatures up to 130°C ; possesses a relatively high mechanical strength, and is unaffected by thermal shock. It is being used in most industries where acids are also being used. Write for particulars to—
KESTNER'S
5 Grosvenor Gardens, London, S.W.1

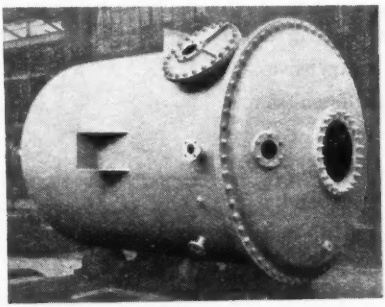
M. & W. GRAZEBROOK LTD

Est. 1750

ENGINEERS and IRONFOUNDERS

Telephone
DUDLEY
2431

Fabricated Plant in Mild and Stainless Steel for Chemical and Allied Trades to Clients' Designs



DUDLEY
WORCS.

Pressure Vessels, Stills, Tanks, etc.

Homogeneous Lead Lining

Max. Machining Capacity 20ft. dia.

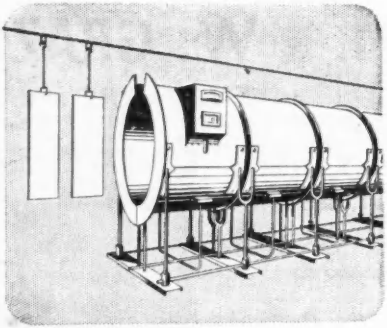
Flash Butt Welding of STEEL RINGS, *etc.*

All Sections—Max: Area 8 sq. ins.

THE STAVELEY IRON & CHEMICAL CO. LTD. CHESTERFIELD

QUICK DRYING BY INFRA-RED

The gas-fired infra-red drying tunnel is robust, compact, inexpensive . . . easily constructed in different shapes and sizes without complicated auxiliary apparatus . . . giving even distribution of radiation and wide range of flux density at the turn of a tap . . . no material difference in drying time due to colour . . . low capital and fuel costs. Technical literature free on request.



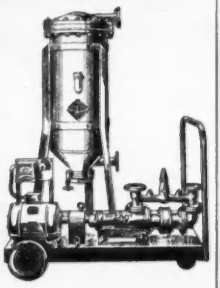
FOR SIMPLICITY & CONTROL
THE CHOICE WILL BE

GAS

BRITISH GAS COUNCIL · 1 GROSVENOR PLACE, LONDON, SW1

Starbright Filtrates

In one mechanical operation the Metafilter filters out every trace of solid matter.
Cleaning by reversal is equally simple—no filter cloths to clean—no expensive filter pads to replace.
A sound engineering job in stainless steel—monel metal—copper or steel.



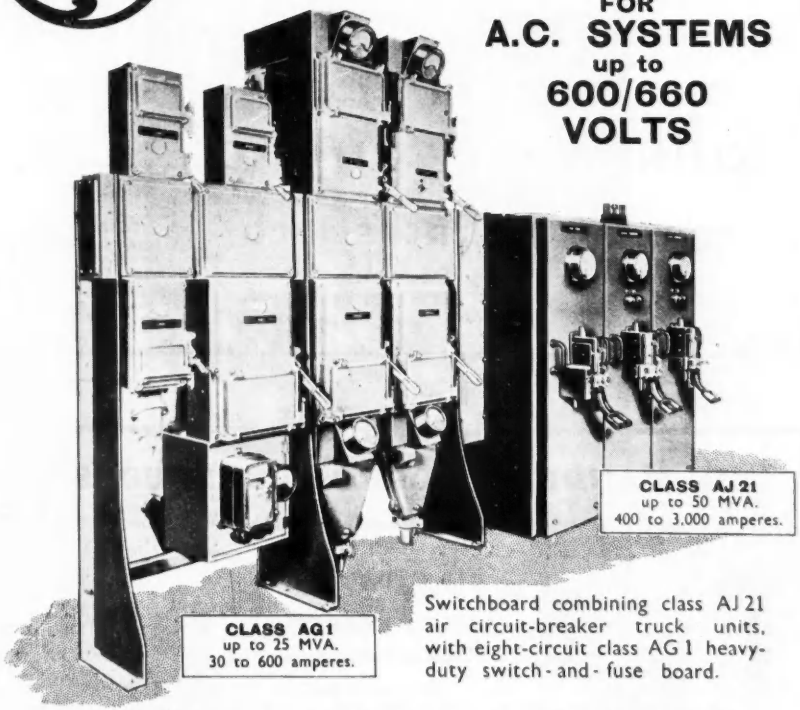
Sizes from 10 gallons to 10,000 gallons per hour.

METAFILTRATION ★ PHONE: HOUNSLOW 1121/2/3
GRAMS METAFILTER HOUNSLOW

THE METAFILTRATION COMPANY LIMITED, BELGRAVE ROAD, HOUNSLOW, MIDDLESEX

METAL-ENCLOSED AIR-BREAK SWITCHGEAR

FOR A.C. SYSTEMS up to 600/660 VOLTS



Switchboard combining class AJ 21 air circuit-breaker truck units, with eight-circuit class AG 1 heavy-duty switch-and-fuse board.

Switchboards of this type can be built up for all medium voltage requirements in power-stations, sub-stations, and industrial establishments.

Fully tested for heavy service motor-starting duty.

BTH WILLESDEN

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED, WILLESDEN, ENGLAND A 3584

INTERMEDIATE PRODUCTS
ANILINE DYES
FAST BASES FOR ICE COLOURS

Benzol, Nitrobenzol, Binitrobenzol, Nitronaphthalene, Binitronaphthalene, Xylol, Nitroxylol, Binitroxylol
Xylidine, Toluol Ortho & Para Nitrotoluol, Binitrotoluol (All Grades)
Para Nitro Ortho Toluidine, Meta Nitro Para Toluidine
ORTHO TOLUIDINE PARA TOLUIDINE

Extensive Range of Oil Colours, Acid Colours, Basic Colours, Direct Colours, Pigment Colours,
Azoic Colours for Wool, also Colours suitable for all Trades
META TOLUYLENE DIAMINE META PHENYLENE DIAMINE

JOHN W. LEITCH & CO., LTD.

MILNSBRIDGE CHEMICAL WORKS

Telephone : 189-190 MILNSBRIDGE

HUDDERSFIELD

Telegrams : LEITCH, MILNSBRIDGE

INDIA
Khatau Valabhdas & Co.
Vadgadi, Bombay.

SCOTLAND
Kirkpatrick & Lauder Ltd.,
180, Hope Street, Glasgow, C.2

CANADA
Prescott & Co., Regd.
2209, Hingston Ave.,
N.D.G. Montreal 28, Quebec.

SAFETY
IN HANDLING CORROSIVE LIQUORS

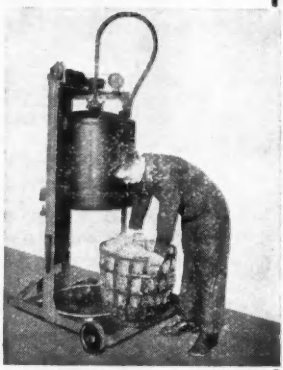
Is a point of law under the new Factory Acts.

The OLDBURY PATENT SAFETY CARBOY DISCHARGER

will empty the contents of any carboy, bottle or vessel and complies with the conditions of the Factory Act, 1937.

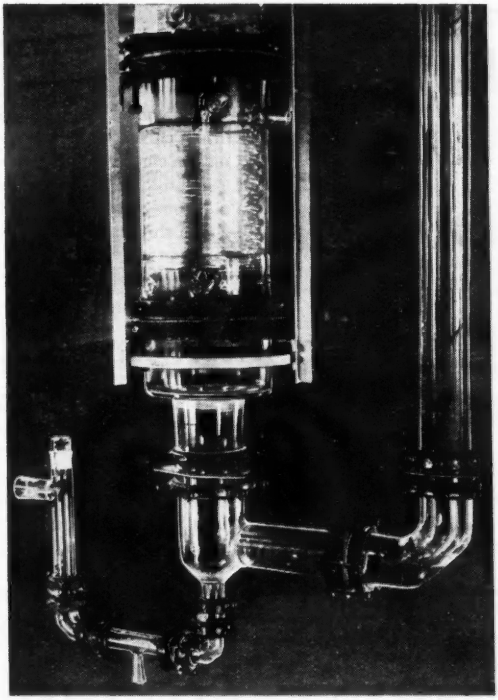
It eliminates all risk of breakage and spilling. Ensures the safety of the operator. It is also the quickest way of elevating the contents of a carboy, etc., up to a height of 40 feet.

Write for Pamphlet



KESTNER'S

Chemical Engineers - 5, Grosvenor Gardens, London, S.W.1



Close-up of the bas of a scrubbing tower incorporating 12 in. diameter 25 sq. ft. heat exchangers, 12 in., 6 in., 4 in., 2 in. and 1 in. pipe line.

Glass assists Industrial Production

A new technique in glass fabrication has brought the advantages of laboratory practice to the aid of the manufacturer. Cleanliness can be ensured by visual inspection at the commencement of production and at changeover. Internal processes can be visually observed, to the advantage of quality and control. If you feel that such equipment has possibilities for you, write and tell us.

We shall be pleased to be constructive in any phase of the application of the equipment.

QUICKFIT & QUARTZ LTD.

INTERCHANGEABLE LABORATORY GLASSWARE
INDUSTRIAL PLANT IN GLASS

Head Office : **1 ALBEMARLE STREET, PICCADILLY, LONDON, W.1.** *Phone : Regent 8171*

Works : "Triplex" Works, King's Norton, Birmingham. Telephone : King's Norton 2031 (5 lines)
"Quickfit" Works, Mill Street, Stone Staffs. Telephone : Stone 481

B.D.H.

fine chemicals

FOR INDUSTRY

B.D.H. Fine Chemicals are available in quantity for industrial and other uses. Please ask for list.

THE BRITISH DRUG HOUSES LTD.
B.D.H. LABORATORY CHEMICALS GROUP
POOLE DORSET
Telephone: Poole 962 *Telegrams: Tetradome Poole*

CHROMATES AND FLUORIDES

Ammonium chromate	Ammonium fluoride
Barium chromate	Ammonium bifluoride
Calcium chromate	Magnesium fluoride
Lead chromate	Manganese fluoride
Potassium chromate	Nickel fluoride
Sodium chromate	Potassium fluoride
Strontium chromate	Sodium fluoride
Zinc chromate	Strontium fluoride

Pure and specially pure grades

NICKEL SALTS

Nickel acetate	Nickel fluoride
Nickel ammonium sulphate	Nickel formate
Nickel carbonate	Nickel hydroxide
Nickel chloride	Nickel phosphate
	Nickel sulphate

Specially pure grades free from cobalt can be supplied if required

CF/LChem/1

CHEMICAL LEADWORK

LEAD LINED TANKS, PIPES, COILS
ELECTRO-PLATING TANKS & FITTINGS

Servicing existing plant a speciality

S. PORTER & CO. LTD.

ASSOCIATED WITH NORDAC LTD.

DUKES ROAD, WESTERN AVENUE
LONDON, W.3

Telephone: ACOrn 2289

The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

BOUVERIE HOUSE, 154 FLEET STREET, LONDON, E.C.4

Telegrams: ALLANGAS FLEET LONDON
Telephone: CENTRAL 3212 (20 lines)

SCOTTISH OFFICE:
116 Hope Street, Glasgow (Central 3970)

MIDLANDS OFFICE
Daimler House, Paradise Street, Birmingham (Midland 0784-5)

THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited

VOL. LX
No. 1544

12 February 1949

Annual Subscription 26s.
8d. per copy, post paid, 10d.

The Teaching of Thermodynamics

AMONG those who have chosen chemical industry for their technical career there are conceivably many who enjoy tackling partial differential equations. They are, nevertheless in the minority; most people find that particular study forbidding—a bridge to be crossed only when no other route is available. Correspondingly, a subject approached by way of partial differential equations fails to commend itself to most people in the student category. This, unfortunately, is certainly true of the important subject of thermodynamics (" The mathematical treatment of the relation of heat to mechanical and other forms of energy ").

To many chemists, mentally immersed in laboratory considerations, thermodynamics may seem a remote subject. Yet it is vital to the development of new products, or new processes for the manufacture of old products, and therefore to the continued prosperity of the industry.

There are considerable gaps in the tables of published physical properties, even of well-established compounds. For new ones, of course, there will be available nothing, beyond the data which the innovating laboratory is itself equipped to determine. But few laboratories are equipped for the accurate measurement, for example, of ranges of vapour pressures or specific heats. Furthermore—turning from properties to reactions—the question often arises whether a proposed new reaction *is at all feasible*. Or, from another point of view, there are frequent discussions around the question of availability of heat for work, usually from steam, sometimes from other sources.

In all these cases, and a multitude of others, the application of laws derived from the fundamentals of thermodynamics gives the research chemist or the process engineer values and indications which are at least useful first approximations—and may be better. Granted that this is the case, what provision is there in lecture-courses or books for helping the ordinary technical worker in the industry to master this important instrument? We will take it that the would-be student is trained to somewhere around the ARIC or degree level—well-grounded in general and physical chemistry and with some basis in physics. His " higher mathematics " is likely to be limited to integration of the simpler types of functions. Of partial differentials and their solution, he is likely to know nothing at all. Some spur and stimulant is needed to provoke the extra effort this last stumbling block admittedly demands.

The normal method of development of the subject of thermodynamics is severely " rational." If the student accepts and remembers the premises and the ideal assumptions, if he follows the line of attack and its maths., then the conclusions surely follow. Unfortunately, in the minds of

On Other Pages

Leader:
The Teaching of Thermodynamics 247
Notes and Comments:
Aluminium Charges Refuted ... 249
No Revelations 249
Speculative Approach 249
Fumes of Industry 250
Precipitated Chalk 250
Building Research 250
Industrial Fluorosis 251
Restrictive Practices in Industry ... 252
Alkali Inspectors' Report 253
Continuous Soap Making 254
Japanese Seawater Process ... 254
Dutch Chemicals 254
Industrial Science Centre 254
N.-Western Chemical Engineers ... 255
Determination, Analysis and Separation Methods 256
Sulphuric Acid Production 257
Production and Stocks of Non-ferrous Metals 258
Progress in Medicinal and Fine Chemicals—IV 259
Dyewood Pioneers 262
Hydrogen Peroxide 262
Detergents and Wetting Agents ... 263
German Potash Recovery ... 264
Underground Gasification 264
Tracer Studies of Fertilisers 265
American Chemical Notebook ... 266
A Chemist's Bookshelf 267
An Accurate Colour Matching Unit 268
Packaging Chemicals 269
Purchase Tax Relaxation 269
Fertiliser Controls Revoked 269
Keener Competition for South African Markets 270
Next Week's Events 274

most students, the conclusions surely follow only in parrot fashion. Line of attack and mathematical methods alike often seem to be sheerest mathematical trickery. If this is true, then the "rational" approach from the physico-mathematical aspect is an irrational one from the standpoint of teaching method. Little wonder that so few students make of it a weapon which they are capable of wielding.

Ultimately, this is a question to be hammered out at the highest levels between teachers. Most students are interested in the subject of thermodynamics because of what they can *do* with it, and that fact could provide the point of contact between teacher and student. Here is where the teacher should start, clearly posing perhaps two successive simple practical questions, quickly running through the solutions (promising later explanations) and showing the answers. The systematic material subsequently presented and its necessary calculus can then be seen by the student in its true perspective, and as a most desirable means of dealing with such problems. These apparently fantastic assumptions about perfect fluids, frictionless pistons, and reversibility, he will then realise, really do stem from the real world and return to it bearing fruitful answers.

Dodge, in his "Chemical Engineering Thermodynamics," handsomely acknowledges this state of affairs in his preface ("the . . . engineering student is a pragmatic individual") and meets its implications in the text itself. American discussions on the subject have been summarised in papers in the *Journal of Chemical Education* (1948, *25*, 126 and 1942, *19*, 376). Conclusions are that in dealing with undergraduates "attention to pedagogy" is essential and interest should be maintained by showing application; this need is considered there to be less desirable for post-graduate students. A brief explanation—or reminder as the case may be—of the significance and simple use of partial differentials, as attempted by Steiner in "Introduction to Chemical Thermodynamics" would be of great help, too.

None of this is to be taken as absolving the student from the responsibility of serious study and further reading. This approach should, on the contrary, spur on such activity, helping to raise the theoretical level and practical results achieved by our limited scientific manpower. There can be no doubt, unfortunately, that in spite of what is being done to provide much more ample training facilities the demand from industry for scientific help will expand at an even greater rate in the next few years. That makes it all the more imperative that training methods should be designed at every point for the optimum "productivity" of its own kind.

NOTES AND COMMENTS

Aluminium Charges Refuted

NO improprieties by Britain have been revealed as a result of the investigation by the Economic Co-operation Administration into the allegations made by Mr. Howard Bruce about the shipping back to the U.S.A. of aluminium or lead financed by ECA. According to the ECA report, there was no evidence to support the accusations made against the United Kingdom, the Netherlands, and Belgium, and the instigator has unreservedly withdrawn his allegations. The basis of the " aluminium mystery " seems to have been the customs declarations, in which material purchased from British dealers, was shown as originating from the United Kingdom. It is now revealed that over 16 million lb. consisted of transshipments which originated outside the United Kingdom, most of it being battle scrap from Europe and North Africa. The verdict is satisfactory and conclusive but it does not dispose of the widespread speculation how such specific and serious charges came to be made before every reasonable precaution had been taken to ensure that they were founded in fact. In fact, there was a wild surmise fathered by a misinterpretation of American shipping returns by one to whom they should have been completely intelligible.

No Revelations

THE President of the Board of Trade's interest in chemical industry is not wholly mercenary, although its monthly contribution of £7-8 million to the credit side of the trading account should endear it to him. His unheralded arrival at the annual dinner in Manchester last week of the North-Western Branch of the Institution of Chemical Engineers gave fresh evidence of his taste for the company to which he might well have belonged, had he followed the family tradition—as he recalled at Manchester. His father, a chemist all his life, and most of his family connections following the same profession, Mr. Harold Wilson confides, in the company of chemists, that he is a black sheep. There, however, his confidences end and his ostensibly innocent observation at the dinner " that he had been reading a lot about Imperial Chemical Industries lately " dissipated of any ill-founded belief that he might be moved to refer to Government proposals regarding chemical industry. He was content to affirm again his conviction that chemical industries were far too complex for study by a " working party " and it was for that reason that the Board of Trade was seeking a " full dress " report from the Association of British Chemical Manufacturers. Although that report is scheduled for the middle of this year, he permitted himself the forecast that it would show that Britain was already leading the world in research.

Speculative Approach

FAR more stimulating than anything said at the dinner of *the* branch of the Institution of Chemical Engineers—there is no other branch—was the witty and challenging presentation by Dr. F. A. Freeth, F.R.S., of the argument for the much wider use by chemical engineers of the law of heterogeneous equilibrium. His contention, before an audience which perhaps expected only academic edification, of the practical importance of the geometer's approach to chemical engineering calculations cannot fail to have stimulated a new line of thought among the proportionately large number of young engineers among the branch members. He showed that, in designing plant, equilibria could be plotted without resorting to laborious chemical analysis and the exercise—in his view a normal spare-time amusement, given a pencil and the back of an envelope—was capable of producing unexpectedly fruitful results. The fact that what Dr. Freeth calls " the speculative and nonsense side " of chemistry has yielded wholly unexpected rewards of extreme importance is established by a host of recorded examples. In that category, according to Dr. Freeth, belongs the inception of his own classical contribution, permitting the production of ammonium nitrate by double decomposition. He reached that result largely by the help of the speculative calculations not specifically required by the work in hand, which he thinks should be the recourse of any young chemist who is not merely content to hand part of his responsibility to the specialist. Amid the increased complexity of present day chemistry and the

widespread acceptance of the necessity to specialise Dr. Freeth's advocacy of the questing, untramelled approach is arresting, and not one which gets much encouragement in the normal university courses. The advocate, it is worth noting, was chief chemist at Brunner, Mond when he was 24.

Fumes of Industry

SEVERAL circumstances have lately combined to produce a lively awareness that with the welcome expansion of many chemical and metal industries is linked the inadvertent production on an increasing scale of some undesirable waste products. The knowledge, dramatically underlined by the extreme case of " smog " fatalities in Donora, Pennsylvania, for which a zinc smelter was suspected, has been brought home in this country by the long drawn out legal action in connection with the principal British producer of aluminium near Fort William, Inverness-shire. The complexity of the problem of producing aluminium by the electrolytic reduction of alumina in molten cryolite, without releasing considerable densities of fluorides in the fume, is made plain in the comprehensive report just issued by the Medical Research Council (page 251, this issue). This is an extremely well co-ordinated piece of work to which almost every kind of expert has contributed. While it reflects, quite incidently, how highly effective are the current methods of estimation and monitoring, it is conspicuous that no very hopeful means of preventing the hazards is suggested. A surprising feature of much of this evidence is that this most potent element, which can cause some metals to ignite spontaneously, cannot be convicted of having lethal effects on humanity in the concentrations met with in the aluminium processes—up to 3.60 mg. per cu. m.—although prolonged exposure can produce alarming changes in bone structure. And, paradoxically, slight exposure to fluorine appears to have a beneficial effect on children's teeth. The damage to pasture and to grazing animals is, however, now fairly well established and from another source, the current report of the inspectors under the Alkali Act, comes evidence that emission of fluoride is by no means confined to the manufacture of aluminium. The fact that for long fluorine fumes have been contaminating industrial atmospheres without having resulted in anything remotely resembling the tragedy in Pennsylvania does not lessen the urgency of the need to arrest them. Unless there is now much warmer encouragement of research in this ostensibly unproductive field the " aluminium hazard " may reproduce itself in other forms on a much wider scale.

PRECIPITATED CHALK

A METHOD for determining the apparent density after compaction of precipitated calcium carbonate (precipitated chalk) was developed several years ago—states the British Standards Institution, announcing the formulation of the new British Standard 1460 : 1948. The method consists of ascertaining the bulk of a known weight of a prepared sample after compaction by a standardised procedure. Experiments showed that it was necessary to describe the apparatus and the method in greater detail than hitherto, in order to avoid misunderstanding.

The institution has now issued the above BS in which the method is set down in greater detail and information is given regarding the order of reproducibility of results which can be expected for different grades of precipitated calcium carbonate. A considerable amount of experimental work took place before this standard could be issued, and the standard method is expected to eliminate discrepancies.

BUILDING RESEARCH

MR. H. M. LLEWELLYN, director of the Building Research Station to be constructed at Thorntonhall, near East Kilbride, addressed the Glasgow section of the Society of Chemical Industry in the Royal Technical College, Glasgow, last week on "Post-War Research in Building Materials."

He said that, while the nucleus of the new station's staff would be drawn from the Building Research Station at Garston, Herts., it was hoped to recruit research workers as soon as possible from the Glasgow colleges and schools.

Dealing with the work for which the new station was being equipped, Mr. Llewellyn described new building materials under consideration and said that an outdoor site had been chosen at Thorntonhall for exposure tests. Two laboratories were being built. An early approach would be made to Scottish industry and on the inquiries received the future research programme of the station would largely be based.

INDUSTRIAL FLUOROSIS

Report of Medical Research Council Committee

A REPORT on industrial fluorosis has just been issued by the Medical Research Council, on the recommendation of its Fluorosis Committee, which was appointed in March, 1945, under the chairmanship of Prof. T. Ferguson, professor of public health at the University of Glasgow, "to determine any effects of exposure to fluorine compounds on workers employed in factories manufacturing aluminium in Inverness-shire by an electrolytic process, and also to determine any similar effects upon those living in the neighbourhood of such factories."

The current report now recalls that when the Medical Research Council was asked to investigate the risks to health which might be associated with the manufacture of aluminium in certain factories in Scotland, an opportunity arose to plan a comprehensive investigation in a circumscribed area. In spite of the difficulties inherent in field research of this kind, studies were eventually completed which covered many aspects of the problem.

Exhaustive Tests

These studies included clinical, biochemical and radiological examinations of selected groups of men, women and children from within the factory and from the surrounding countryside, and studies of the condition of sheep and cattle grazing in the vicinity. The findings were related to the precise environmental exposure to fluorine as determined by analyses of the atmosphere, drinking water, and soil and vegetation, at varying distances from the source of contamination.

The results show that a large amount of fluorine is liberated from the factory and that the employees, particularly those in the older type of furnace room, are exposed to concentrations which are considerable. Nevertheless, the effects so far observed among them are minimal, states the report.

Some of the older workers, who had been exposed for many years to concentrations probably higher than those generally prevailing at the time of the investigation, showed X-ray changes in bone which could be ascribed to fluorosis; in none of these workers, however, was there any clinical disability. Some degree of mottling of the teeth was found in only 5.6 per cent of a sample of school children in the area. On the other hand, these concentrations of fluorine seem to constitute a severe hazard to animal health and create "a serious impediment to economic methods of sheep and cattle farming in the area."

Although the effects on human beings are at present small, the committee expresses general agreement that the findings as a whole suggest that every possible step should be taken to reduce the amount of fluorine discharged from the factory. It is of interest to mention that the request to carry out this investigation resulted from the initiative of a few individuals whose observations in the area had led them to suspect the possibility of a risk to health.

Full Collaboration

In the preface to this report, which is obtainable from His Majesty's Stationery Office, price 4s net, the Medical Research Council gratefully acknowledges the willing co-operation which it has received throughout the investigation from the management and workers of the British Aluminium Co., Ltd. It also expresses its appreciation of the services of the Fluorosis Committee and of all those who took part in the scientific studies.

From the mass of data collected in the course of the investigation, certain general conclusions have emerged. It is clear that, especially in the older type of furnace room, workers inhale considerable quantities of fluorine. The published conclusions of the committee state that some of the older workpeople, exposed for a large number of years to conditions prevailing in the old furnace rooms, show bone changes of the type now generally recognised to be produced by fluorosis. Despite these bone changes, as demonstrated by X-ray examination, none of the workers examined was found to suffer clinical disability.

Gradual Effect

It does not follow, states the committee, that the risk to health of workers in the older type of furnace room is negligible, for it is well known that the progressive course of fluorosis is slow; rather are the changes to be regarded as a warning that the conditions under which these men work are such as to call for constant vigilance and for determined efforts to reduce the amount of fluorine to which they are exposed.

It is, apparently, more difficult to speak with certainty about the risk to human health outside the factory. Examination of samples of air, soil, etc., has established beyond doubt that the amount of fluorine liberated from the factory is very considerable. On account of the configuration of

(*Continued at foot of next page*

Restrictive Practices in Industry

Manufacturing Groups Not the Principal Offenders

"I DO believe that the possession of monopoly power by any one firm or group of firms is a danger in so far as it will tend to raise prices. It is a potential danger to the economic life of the nation," said Mr. B. S. Yamey, lecturer on commerce at the London School of Economics, in the course of a paper on "Monopolies and Restrictive Practices" before the Incorporated Sales Managers' Association at its recent conference in London. The purpose of the conference was to discuss the influence of sales management in promoting increased production.

Defining Monopoly

The speaker contended that there should be expert inquiry into any monopolistic or restrictive practices wherever a judgment is arrived at by the Commission set up under the Monopolies and Restrictive Practices (Inquiry and Control) Act, 1948. It was necessary, however, to be clear about terms. The term "monopoly" was generally used to describe a market situation where one firm (or a group of firms acting in concert) controlled so large a portion of the total supply of a commodity that it might wield control over prices.

Control might be effected in many ways, *e.g.*, by direct price-fixing, by restriction of supplies, or by sharing of markets. The term "restrictive practices" was less well-defined. It might be taken to mean any practice through which monopoly power was expressed, or any practice which attempted to bolster up a monopoly.

A number of the members present who contributed to the discussion which followed Mr. Yamey's paper agreed that before one condemned monopolies, or even attempted to discuss them or restrictive practices, it was first necessary to be quite clear as to the meanings of the terms. Several cited Imperial Chemical Industries, Ltd., as being popularly believed to be a monopoly, yet that organisation did not wield completely monopolistic power over more than a few of the chemicals it produced.

One speaker expressed the view that there were restrictive practices in trade unions which were far more dangerous to the well-being of this country than any monopolies in industry. There were, too, conspicuous monopolies wielded by the State in a number of industries.

Another speaker traced the more serious restrictive practices in industry to the policy of organised labour. He said things had become so bad that one could regard the two sides of industry as being "labour" on the one hand and "productivity" on the other. Unless labour was prepared to give a full day's work for a full day's pay, and to give up the "closed shop" idea, it would be useless to discuss monopolies and restrictive practices. A very true modern twist to an old proverb was:—"All play and no work makes Jack a smart Alick."

Too Free

Another speaker maintained that one "restrictive practice" which might have been more widely employed was that represented by the patenting of any process discovered in this country. He had in mind penicillin. It would be remembered that, while Britain made the original discovery relating to this process of mould growth preparation, America, because of her more convenient manufacturing facilities in wartime, was handed the process and the precaution of patent protection was not taken. America improved the process, went ahead with manufacture and lost no time in taking out patents. We had since had to pay to America some hundreds of thousand pounds for the privilege of making penicillin in Britain under licence.

INDUSTRIAL FLUOROSIS

(*Continued from previous page*)

the country, the direction of the prevailing winds, and the heavy rainfall, fluorine compounds in the atmosphere tend to be deposited, in the main, along a tract of country which can be defined in the light of the analytical results.

The extent of the area affected may, of course, vary in time with changing circumstances, but information of this type ought to be of value in planning new developments, says the report; for, while clinical examination of a small number of residents in the neighbourhood of the factory has shown no sign of injury to health, it is only prudent to site new developments in such a way that, so far as possible, residents are kept out of the zone known to be most liable to contamination.

The effects on animal husbandry of fluorine contamination of herbage have been described in detail. They obviously constitute a serious impediment to economic methods of sheep and cattle farming in the area. The importance was stressed that everything practicable should be done to reduce the amount of fluorine discharged from the factory.

ALKALI INSPECTORS' REPORT

Increasing Complexity of Preventive Measures

THE continued widening of the guardian functions of the chief inspectors fulfilling the requirements of the Alkali, etc., Works Regulation Act and the body of associated legislation is effectively represented in the 84th annual report (for 1947) on Alkali, etc., Works.* Although it is shown that there was small reduction (18) of the number of works in England registered under the Act (1015 in 1947, involving the operation of 1843 distinct processes) it is clear that the maintenance of effective precautionary measures against the emission of noxious matter has become much more complex.

There are a number of "borderline" processes not at the moment registered under the Act, to which the inspectors have had to pay some attention; and the relatively higher standard of prevention which technical advances have made possible has called for fresh study of many problems by the inspectors and the expert staffs of the works concerned.

It is evident in many of the reports on individual cases that generally the most cordial collaboration has existed between the officials and the many alkali and similar undertakings visited during the year.

Fluorine

Indicating the extension of responsibilities caused by development of relatively new industrial processes and the heightened awareness of the dangers associated with the dispersion of chemical materials in the atmosphere is the handling during 1947 of the subject of fluorine emission—a specific study of which forms the subject of another authoritative survey (page 251 this issue).

The report makes it clear that the distribution of fluorine gases or fluorides may be much more widespread than in the few areas in which electrolytic reduction of aluminium is carried on. Any danger there may be is associated almost entirely with vegetable life and grazing animals.

It is stated here that fluorine is found not *in* the grass but *on* it and that contamination is superficial and does not enter the soil. This statement, however, conflicts with the findings of the survey "Industrial Fluorosis," in which reference is made to varying penetration at various soil depths.

The alkali inspectors observe that fluorine is widely distributed as a minor constituent of commonly used raw materials such as coal, clay, ironstone, etc. When these materials are heated to a sufficient degree —or burned—the fluorine is evolved as a gaseous compound or in some instances possibly as a fluoride dust. There are also similar but more concentrated fluorine emissions from hydrofluoric acid works and superphosphate works, but these are registered under the Alkali Act and are satisfactorily dealt with.

Other Sources

A greater difficulty exists in connection with the attenuated "fluorine" content of chimney gases at certain brickworks, pottery kilns, large coal burning installations and emissions from the calcination of ironstones.

In the wider field, the inspectors report that the 3682 visits to works, of which 291 were not registered under the Alkali Act and 212 were in fact spoilbanks, only one case was found where the escape of hydrochloric acid was in excess of the permitted limit. There were, however, 13 cases of excessive escapes from sulphuric acid works. Inquiries were made into five accidents, associated with the emission of foul gas, three of which were fatal.

The standard of operation of works in 1947, says the report, was generally higher than in recent previous years. The improvement may be attributable to the better type of labour which is becoming available and the growing experience of younger employees.

Material Shortages

Certain of the inconveniences of the war period have disappeared, but unfortunately there has remained the great difficulty of obtaining material required for plant maintenance or replacement and in several instances much needed improvements have had to be postponed.

A number of coke ovens has been transferred to the ownership of the National Coal Board, with little alteration in the technical management of the individual works. Although much reconditioning has taken place and several new batteries of ovens have been brought into use, there has been no extension of the practice of providing double collecting mains for the crude gas. Where such double mains have been installed the reduction in emission of smoke and grit has been marked.

*"Eighty-fourth Annual Report on Alkali, etc. Works, by the Chief Inspectors" HMSO 9d. net.

Continuous Soap Making

Principles of a French Process

At one of the recent meetings organised by the Soc. d'Encouragement pour l'Ind. nat., F. Lachampf, director of the Monsavon laboratories, described his process for the continuous manufacture of soap.

Since saponification is a reaction taking place between two immiscible phases, the greater the surface area involved the more rapidly is the process effected. It is thus necessary to have a very finely dispersed water-in-oil emulsion. Soda concentration should be at least 35 per cent, and starting temperature low. With a sufficiently fine emulsion, the time of reaction should not exceed two minutes.

The apparatus required consists of the requisite pumps for alkali and fat, a powerful mixer, a homogeniser, heating contact reaction walls, and a four-stage tower or column for washing the soap. Washing is effected when the soap in its most concentrated anisotropic phase : the smooth phase. A salt solution of suitable concentration is used, with which the soap is in equilibrium and in which it will not dissolve. It is essential that, when equilibrium is attained, the concentration of the under-laye.· of lye is higher than the Merklen limit. Such equilibrium is very quickly reached and there is vigorous stirring or intermixing of the soap with the lye. Decanting (separation) is instantaneous.

The method is said to offer numerous advantages : rapidity of reaction, economy of fuel and plant, etc.

DUTCH CHEMICALS

PLANS for the production of new cellulose derivatives, which have been successfully tested in their research laboratories, are now being carried out by Algemene Kunstzijde Unie, of Arnhem, one of Holland's principal rayon producers. Carboxyl methyl cellulose, one of the first cellulose plastics to be brought on the market in increasing quantities, is expected to replace similar materials formerly imported from Germany and the U.S.A. Claims have been made that this material is already being manufactured by another producer, but AKU assert that their product has special qualities adapted to needs for viscosity, etc.

In order to re-popularise the use of natural antimalarial drugs, it is reported that sale of Indonesian cinchona bark to quinine producers will be freely permitted. This will bring to an end the restrictions enforced by the convention which obliged international quinine producers to share out the material.

Japanese Seawater Process

Bid to Relieve Caustic Shortage

TO relieve the shortage of caustic soda, research is being carried on in Japan to obtain production by direct electrolysis from sea water. At a factory at Iwakuni a 99.8 per cent concentration of soda is stated to have been obtained, with a yield of chloride and bromide as by-products. Energy required per ton of caustic soda is 12,000 kWh (compared with 3000 by ordinary methods), but this disadvantage is compensated by economies in fuel, labour and the avoidance of purification and preparation of pickling brine.

Other inventions with a future include the use of residuary oil for the manufacture of printing ink, the simultaneous production of phosphorus and potassium phosphate for manure by processing potassic felspar or another potassic mineral and phosphate with coal. Output and purity of the phosphorus is increased.

In the year following the attack on China, chemical production represented 17.6 per cent of total industrial production. There were 3000 factories employing 250,000 persons. Japan then had the greatest rayon industry in the world. At the moment, there is a stortage of almost all chemical products and a danger of epidemics because the water cannot be purified. The devaluation of the yen is preventing chemical supplies being obtained from abroad.

INDUSTRIAL SCIENCE CENTRE

A LABORATORY of very modern character, costing £30,000, is now in the course of erection in Dublin, and is expected to be completed by the end of the year. It will be staffed by chemists, physicists, and technicians belonging to the Institute for Industrial Research and Standards, whose work is to promote the expansion of existing industries or the development of new ones and the utilisation of waste products.

The new laboratory will form an integral part of the future administrative premises of the institute and will have a staff of about 12 to 14. Testing and proof houses will probably be added later.

Since the institute was set up in 1946, it has been experiencing difficulties in recruiting staff, and its work has been hampered because of inadequate laboratory facilities. Although a small temporary laboratory is functioning at the moment, most of the research work already completed has had to be carried out in the various universities.

North-Western Chemical Engineers

Board of Trade President Reviews Achievements and Prospects

THE importance of Manchester's rôle in past, present and future development of chemistry and chemical engineering was the theme of several speakers at the annual dinner in Manchester on February 4, of the North-Western branch of the Institution of Chemical Engineers. The importance of the engineers from many contemporary points of view was reflected in the attendance of the Lord Mayor of Manchester (Ald. Miss M. L. Kingsmill Jones), the President of the Board of Trade (Mr. Harold Wilson) and a number of distinguished figures in chemistry and chemical industry. The retiring chairman, Mr. T. Penny, presided.

Manchester's early leadership was recalled by the president of the institute, Mr. H. W. Cremer, C.B.E., proposing "The City and Port of Manchester." He recalled that Manchester could claim to have provided the first text-book of chemical engineering —that of George E. Davis—and Rutherford had provided the supreme example of the city's tradition of nonconformity, in the splitting of the atom, in despite of Dalton. He considered it was a remarkable omission that Manchester University had no chair of chemical engineering and suggested that this would be an appropriate subject of an approach to the University Grants Committee.

The response to the toast was given by the Lord Mayor, who recalled Manchester's significance in the cultural and economic affairs of the country and described the great development of the services which it offered to shipping and manufacturing industries.

The Next Stage

Mr. Harold Wilson proposed the toast of "The British Chemical Industry," to which a response was made by Mr. W. F. Lutyens, of Imperial Chemical Industries, Ltd. The President of the Board of Trade said that, while the industry's main responsibility was to afford the essential materials required to keep the rest of industry supplied, it had succeeded in making great increases in its exports, which, in terms of volume, were to-day 56 per cent larger than they were in 1940. It was now faced with the challenge to provide exports to the value of more than £9 million monthly by the end of 1949 and was already conferring great benefits by saving dollars, both directly and by the great assistance it was giving to larger agricultural production. In the interests of full employment and of the reconstruction programme there had arisen a demand for basic products far in excess of anything experienced before. It had involved restriction of capital expenditure, but in spite of this the plans for the expansion of chemical industry had gone on. The importance which the Government attached to this was reflected by the fact that expansion and building programmes for chemical industries to the value of over £200 million had been sanctioned.

50 p.c. More Dyestuffs

From these schemes would be derived a host of new supplies, of such things as alkalis, synthetic fibres, fertilisers, carbon blacks and a wide range of organic chemicals. Chemical engineers could take great credit for the fact that current production of dyestuffs was more than 50 per cent higher than it was before the war; many of the new plants were already in production, holding out the prospect of our becoming self-supporting in dyestuffs and more than self-supporting in some other chemical materials. These developments and the contemporary oil refinery programme would go far to help balance our overseas payments and improve the country's prospects of standing on its own feet by 1952.

Mr. Wilson re-affirmed his conviction that the subject of chemical industries was too complex a one for a successful study to be made by the "working party" technique.

Coupling with the toast the name of Mr. W. F. Lutyens, the speaker acknowledged the great benefits which were conferred by Imperial Chemical Industries' research and imaginative policy.

Industrialists' Views

In his response to the toast, Mr. Lutyens spoke of the satisfaction conveyed by the president's appreciation of what chemical industries were doing. Referring to the report on chemical industry which was being prepared, he expressed his conviction that the ABCM would succeed in presenting a true picture, and he felt they would all share Mr. Wilson's interest in the result. There was no truer index of the standard of living than the level of a people's consumption of chemicals.

The toast of "The Institution of Chemical Engineers, North-Western Branch" was submitted by Mr. E. A. O'Neal, who, noting the important status chemical engineering had attained, recalled that when he entered chemical industry in 1925 his status was virtually that of "handy-

man." One view of functions in chemical industry was that the chemist originated the idea and put the result in a test tube, while the chemical engineer looked on to see it did not explode. Management to-day participated increasingly and saw all the engineering activities as a group function. He was satisfied, however, that too much emphasis could not be laid on the importance of ample training for the individual scientist.

Mr. T. Penny, retiring chairman of the branch, responding to the toast, spoke of the great experience of friendship which tenure of that office, on which Mr. E. J. Dunstan was now entering, had provided. He congratulated him and spoke appreciatively of the work of the honorary secretary, Dr. J. S. Hunter.

The health of the guests was proposed by Mr. J. McKillop, and Mr. R. E. Huffam responded. Mr. Huffam said he was aware that the shortage of chemical engineers still persisted, but reminded the profession that when it had been able to fill all the vacancies in chemical industry there would remain a great need of chemical engineers in other industries.

Assembling for the annual meeting in Manchester earlier the same day, the North-Western branch was accorded a civic reception by the Lord Mayor and received an expression of the good wishes from the Institution president, Mr. H. W. Cremer. The following were elected to office for the current year: chairman, Mr. E. J. Dunstan; vice-chairman, Mr. T. Penny, honorary secretary, Dr. J. S. Hunter; honorary treasurer, Mr. F. H. Bramwell; new members of committee, Mr. A. Potter, Dr. S. H. Wade, Mr. E. Woollatt.

At the close of the formal proceedings, the branch heard a highly stimulating presentation by Dr. F. A. Freeth, F.R.S., of the case for a more general familiarity with the principles of heterogeneous equilibrium and their profitable application to chemical engineering precedure.

Determination, Analysis and Separation

PAPERS presented and discussed at the recent meeting, in London, of the Society of Public Analysts and Other Analytical Chemists (Mr. Lewis Eynon, president, in the chair), included one entitled "A Rapid and Accurate Volumetric Method for Determination of Silica," by H. N. Wilson. In this it was stated that the method depends on the conversion of ortho silica to silicomolybdic acid, its precipitation as quinoline silico-molybdate and determination by residual titration, after solution in alkali hydroxide.

The siliceous material is fused with sodium hydroxide, extracted with hot water and acidified with a sufficient excess of acid to yield, after the addition of ammonium molybdate, a *p*H value of about 1.5. After formation of the complex acid, the solution is strongly acidified and warmed and an acid solution of quinoline hydrochlorate is added to precipitate the silicomolybdate.

The precipitate is filtered, washed, dissolved in excess of standard hydroxide solution and the excess determined by titration with standard acid, in a manner analogous to Pemberton's method of determining phosphorus.

"The Analysis of Nylon and Related Polymers," by M. Clasper and J. Haslam was the subject of another paper. A method has been devised for the examination of nylon and related polymers, the paper stated. It is based on hydrolysis with hydrochloric acid followed by determination of the proportion and properties of the resulting organic acid and base. Examples were described of the application of the method to 66 nylon, 610 nylon, 6 nylon (caprolactam), and 66 nylon modified with formaldehyde, and to co-polymers. A method for determining adipic and sebacic acids in their mixtures and for isolating the pure acids was also described. Examples were given illustrating the application of the methods in the routine analytical work of a plastics laboratory.

A further paper was on "The Quantitative Separation of Beryllium and Aluminium," by W. C. Coppins. In this a procedure was described for separating quantitatively a mixture of sodium beryllate and aluminate, in which advantage is taken of the fact that sodium aluminate is more stable on boiling than is the beryllium salt.

To mixtures, known to contain both metals, in alkali hydroxide solution, sufficient diluted hydrochloric acid is added to cause incipient precipitation of beryllium hydroxide and the precipitation is completed by boiling. Aluminium remains in solution. The precipitate is washed with dilute sodium chloride rendered alkaline by sodium hydroxide to a green end-point with indigo carmine.

After purification by re-precipitation and washing with dilute ammonium chloride solution it is ignited to oxide. For solutions of low or known beryllium content, the green colour with indigo carmine is used to indicate the correct degree of neutralisation for the separation.

SULPHURIC ACID PRODUCTION

Some Increase in October — December

THE classified summary issued by the National Sulphuric Acid Association, Ltd., shows an increase in production and consumption, in the United Kingdom and Eire, in the period October-December, 1948, of sulphuric acid and oleum, over the preceding three months. The comparative figures were: Production: 415,958 tons, against 382,741 tons in July-September. Consumption: 414,795 tons, compared with 383,380 tons in July-September. Notable increases in consumption of individual items in the three months ending December, 1948, were: Superphosphates 126,643 tons, compared with 110,296 tons in the preceding three-monthly period; sulphate of ammonia 64,682 tons, against 60,523 tons (July-September).

Total production of sulphuric acid and oleum in the United Kingdom and Eire for the year 1948 was 1,601,438 tons. The total consumption during 1948 was 1,613,208 tons. The principal items contributing to this latter figure, in order of quantity, were: Superphosphates 503,786 tons; sulphate of ammonia 250,487 tons; rayon and transparent paper 153,726 tons; iron pickling (including tin plate) 86,426 tons; dyestuffs and intermediates 78,415 tons; paint and lithopone 68,972 tons. The last quarter's figures are:

SULPHURIC ACID AND OLEUM
Tons of 100% H_2SO_4

	Chamber only	Contact only	Chamber and Contact
Stock Oct. 1, 1948	32,521	31,050	63,571
Production ...	198,493	217,465	415,958
Receipts	41,046	22,807	63,853
Oleum feed ...	—	3,104	3,104
Adjustments ...	—194	—13	—207
Use	120,830	77,741	198,571
Despatches... ...	114,074	165,872	279,946
Stock Dec. 31,	36,962	30,800	67,762
Total capacity represented ...	215,620	225,600	441,220
Percentage production	92.1%	96.4%	94.3%

RAW MATERIALS
Tons

	Pyrites*	Spent Oxide	Sulphur and H_2S	Zinc Concentrates
Stock Oct. 1, 1948	62,738	161,884	67,994	13,407
Receipts	86,350	63,652	61,049	36,714
Adjustments ...	+65	+213	+303	—14
Use	83,864	50,969	71,760	33,641
Despatches... ...	66	5,040	360	9
	4†	191†		
Stock Dec. 31,	65,219	169,549	57,226	16,457

* "Receipts" and "Use" include anhydrite "converted" to pyrites.
† Used at Works for purposes other than sulphuric acid manufacture.

CONSUMPTION OF SULPHURIC ACID AND OLEUM
UNITED KINGDOM AND EIRE
October 1—December 31, 1948

Trades	Tons 100% H_2SO_4
Accumulators	2,820
Agricultural purposes	1,062
Bichromate and chromic acid	2,806
Borax and boracic acid ("Unclassified")	
Bromine	3,587
Chlorsulphonic acid (" Unclassified ")	
Clays (Fuller's earth, etc.)	1,919
Copper Pickling	743
Dealers	4,887
Drugs and fine chemicals	2,517
Dyestuffs and Intermediates	19,719
Explosives	3,094
Export	932
Formic acid (" Unclassified ")	
Glue, gelatine and size	315
Hydrochloric acid	15,936
Hydrofluoric acid (" Unclassified ")	
Iron pickling (incl. tin plate)	22,175
Leather	1,982
Metal extraction	429
Oil (mineral) refining	11 108
Oil (vegetable) refining	2,985
Oxalic, tartaric and citric acids (" Unclassified ")	
Paint and lithopone	18,836
Paper, etc.	929
Phosphates (industrial)	1,266
Plastics, not otherwise classified	3,179
Rare earths (" Unclassified ")	
Rayon and transparent paper	40,116
Sewage	2,554
Soap and glycerine	1,208
Sugar refining	187
Sulphate of alumina (" Unclassified ")	
Sulphate of ammonia	64,682
Sulphate of barium	1 218
Sulphate of copper	4,942
Sulphate of magnesium	1,684
Sulphate of zinc	791
Superphosphates	126,643
Tar and benzol	4,420
Textiles	6,138
Unclassified—Uses known	26,375
Uses unknown	10,611
Total	414,795

JANUARY'S STEEL RECORD

AN encouraging start to 1949 is shown in the January figures of pig iron and steel production issued by the British Iron and Steel Federation. The average rate of steel production for January this year was 288,500 tons per week, an increase of 7900 tons over the same month in 1947, which was the previous best January output.

The detailed figures for the year and for January were as follows:—

	Year		January Weekly Average	
	1947	1948	1948	1949
Pig iron (tons)	7,785,000	9,276,000	167,800	178,100
Steel ingots and castings (tons)	12,724,000	14,877,000	280,600	288,500

Production and Stocks of N.-F. Metals

THE following particulars of production, stocks, consumption, imports and exports of non-ferrous metals in the United Kingdom in December are extracted from the monthly figures supplied by the British Bureau of Non-Ferrous Metal Statistics.

UNWROUGHT COPPER

	Long Tons	
	Blister Copper	Refined Copper
OPENING STOCKS:		
Govt. and consumers' stocks ...	37,233	78,420
Imports into U.K.	6,109	21,112
PRODUCTION:		
Primary	—	10,593
Secondary	1,211	5,714
CONSUMPTION:		
Primary	10,663	28,326
Secondary	—	13,270
EXPORTS FROM U.K.	1,652	13
CLOSING STOCKS:		
Govt. and consumers' stocks ...	36,401	84,320

GROSS OUTPUT OF MAIN COPPER, ALLOY AND PRODUCTS

Unalloyed copper products	25,171 long tons
Alloyed copper products	23,206 " "
Copper sulphate	3,224 " "

UNWROUGHT ZINC

	Long Tons	
	Zinc in Concentrates (estimated gross zinc content)	Slab Zinc (all grades)
OPENING STOCKS:		
Govt. and consumers' stocks	11,628	49,905
Imports	9,252	8,692
PRODUCTION:		
Virgin and remelted	—	5,589
CONSUMPTION:		
Virgin (incl. debased)	6,412	18,004
Remelted and scrap	—	6,809
EXPORTS	—	16
CLOSING STOCKS:		
Govt. and consumers' stocks	14,468	46,709

LEAD

	Long Tons		
	Lead in Concentrates	Imported Virgin Lead	English Refined	Lead Content of secondary scrap and Residues
OPENING STOCKS:				
Govt. and consumers' stocks	—	19,427	1,976	—
IMPORTS	—	13,817	—	—
PRODUCTION ...	132	—	2,905	—
CONSUMPTION ...	132	15,698	1,991	10,457
EXPORTS	—	124	—	—
CLOSING STOCKS:				
Govt. and consumers' stocks	—	17,070	2,890	—

TIN METAL

	Long Tons
GOVT. AND CONSUMERS' STOCKS AT END OF PERIOD	12,817
IMPORTS	—
PRODUCTION	3,176
CONSUMPTION	2,016
EXPORTS AND RE-EXPORTS	236

ANTIMONY

	Long Tons
TOTAL CONSUMPTION OF ANTIMONY METAL AND COMPOUNDS	332
TOTAL CONSUMPTION OF ANTIMONY IN SCRAP	236

CADMIUM

	Long Tons
TOTAL CONSUMPTION OF CADMIUM	38.95

The Bonding of Aluminium to Steel

THE bonding of aluminium to steel or other ferrous material is a process for which there are many potential uses, hitherto discouraged by practical difficulties. What is claimed to be a successful and simple procedure for producing such bonds, using an intermediary alloy, has been published by General Motors, Inc. (U.S.A.) in the English Patent application No. 11639/1948 (Conv. date June 19, 1947).

The steel or other ferrous metal article is first subjected to an acid etch (hydrochloric acid of 22° Bé at 90—100°F., for 5-10 minutes) after having been thoroughly cleaned. After etching it is again thoroughly washed in hot water, kept free from moisture and oxide formation, and placed in a molten alloy bath.

If there has been any delay in this operation any oxide formed must first be removed, for example, by immersion in a flux which may be a 10 per cent solution of zinc ammonium chloride at 150°F. It remains in the molten alloy bath for sufficient time to bring it to the melting temperature of the alloy, which may be a zinc base alloy containing tin and a small amount of aluminium. The temperature is about 1420°F. After removal from this bath it is immediately placed in the mould and molten aluminium or aluminium alloy is cast around it.

B.I.F. Catalogue for Overseas.—Three months before the opening of the British Industries Fair, nearly 10,000 copies of the catalogue have been despatched to trade buyers in all parts of the world. The catalogue, which will be presented free of charge by Government officials overseas, is in two parts totalling more than 2000 pages. The advertisements are now indexed and linked with the advertisers' stand numbers.

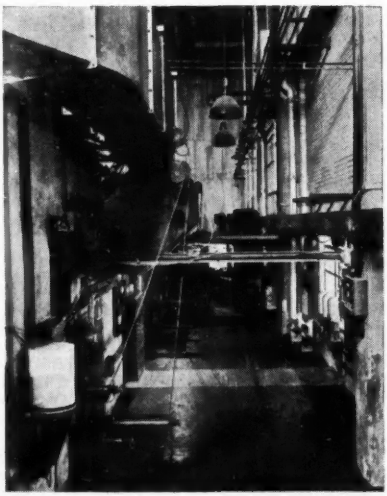
Progress in Medicinal and Fine Chemicals—IV

Limitation of Use of Radioactive Tracers

by G. COLMAN GREEN, B.Sc., F.R.I.C., A.M.I.Chem.E.

THE gradual widening of the nuclear fission programme, including such factors as full-scale operation of the new atomic pile at the Atomic Energy Research Establishment, Harwell, has greatly enlarged the prospects of using in research radioactive isotopes of increasing variety.

Hitherto, radioactive material in this country has been drawn mainly from the U.S.A., a consequence of the decision taken during the war to concentrate work on the atomic bomb in America. The literature already abounds with instances of applications of the new isotopes which have become available since the end of the war and most of these are, of course, to be found in the American literature. In the fields of medicine, biochemistry, physiology and medicinal chemicals these new tools will prove of the highest value in elucidating mechanisms, reactions to biological effects which will lead to an increasing understanding of disease and functional disorders.



On the the left of this view is the control face of the "Gleep," now the main source radioactive isotopes used in this country
(Crown Copyright)

The importance of these isotopes in research is reflected in the fact that the Ministry of Supply in recent months purchased from the Eastman Kodak Co., Ltd., in U.S.A., a quantity of the isotope N^{15} at $200 per gram, the N^{15} being present at a concentration of 30 per cent in the ammonium radical of ammonium nitrate. Part of the material was allocated to research workers at the Department of Scientific and Industrial Research and to the Medical and Agricultural Research Councils.

The past year has introduced the entirely new factor that radioactive isotopes have commenced to become available from the Atomic Research Station at Harwell, which started in August, 1947.

British Isotopes

The allocation of isotopes from the existing pile—the "Gleep"—is in the hands of the Isotopes Allocation Committee under the chairmanship of Sir John Cockroft, on which is represented the Medical Research Council. Demand for these isotopes is reported to exceed supply and, for the present, commercial production of enriched N^{15} is being undertaken by Genatosan, Ltd. Later, the production of enriched C^{13} and O^{18} is to be undertaken at Harwell.

The irradiation of any material in this low-power pile at Harwell is at present carried out at a standard handling charge of £3 3s. (£2 2s. for repeat orders) for each four-week period. There is as yet no charge based on the activity of the product. The charge for separated isotopes has been fixed for the time being, as a matter of convenience, at the equivalent of the charges made in America for similar material by the U.S. Atomic Energy Commission.

When the larger Harwell pile comes into full production, specifications will be fixed on the same basis as those fixed by the U.S. Atomic Energy Commission.

The general position, especially as regards supply of this material from Harwell and the U.S.A., has been summarised in *Nature* (1948, *162*, 786). It has been reported (*J. Amer. Med. Ass.*, 1948, *138* (5),

343) that C^{14} is available from Oak Ridge atomic pile at $50 per millicurie.

Had the material been produced by a cyclotron, the only apparatus formerly available, the cost would have been of the order of a million dollars per millicurie (*Dept. of State Publication*, 3161, June, 1948).

The unit of radioactivity, in the curie, is the number of particles emitted per second by one gram of pure radium element. A tracer has an activity of one curie if it emits the same number of particles per second as does one gram of radium freed from its radioactive disintegration product. The official value for a particle is 3.7×10^{-10} particles per sec. On a corresponding basis, β and γ particles may be assayed.

Biology Findings

From the point of view of medicine and biology, the important feature of the technique is that it is possible to trace any molecule or atomic group which may be of interest.

By following the fate of groupings in this way important light is being shed on intermediate metabolism and physiological processes. There is no other tool available for this purpose in most cases.

It has, of course, been established that the living organism can distinguish one isotope from another only with great difficulty, if at all. This fact was established by the work of Hovesy and his successors soon after the discovery of isotopes at the beginning of the century.

Techniques exploiting the use of isotopes in biological work received wider development when Schoenheimer and Rittenburg further elaborated the methods after Urey and his co-workers had achieved bulk separation of isotopes in the early 'thirties.

Procedures now adopted in the preparation of labelled compounds have been summarised by Kamen ("Radioactive Tracers in Biology"; Academic Press, Inc., N.Y.; 1947). He deals, also, extensively with the introduction of such labelled compounds into the biological systems and the subsequent separation and determination of the distinguishing element in various biochemical fractions.

Essential Requirements

Kamen points out that, before results can be interpreted correctly, certain fundamental criteria must be met. They are, briefly: (a) the initial concentration of the tracer must be sufficient to withstand dilution during metabolism. (b) throughout metabolism the "label" must adhere to the particular molecule or portion of molecule into which it was introduced for the purposes of study; (c) abnormalities of metabolism or diffusion, permeability, etc., must not be brought about by the introduction of the isotope into the biological system; and, (d) the half-life of the isotope must be sufficiently long to enable it to be extracted, characterised and assayed before it has decayed.

Quantitative determination of radioactive isotopes in the various biological or biochemical fractions requires the use of one of a number of instruments, the action of which depends upon ionisation effects produced in gaseous media by the radiations emitted. The best known of these instruments is the Geiger-Mueller tube counter.

Counters have undergone considerable elaboration since this instrument was first devised by H. Geiger and W. Mueller. Frisch (*Brit. Med. J.*, 1948, No. 4567, 164) has referred to a recently introduced system of measurement based on the recording of small light-flashes which fast electrons produce on their passage through naphthalene. "Autoradiographs" have also been developed by placing tissue slices containing isotopic material in contact with photographic plates. The position of the radioactive isotopes in the slice may be identified with precision.

Howarth (*Brit. Med. J.*, 1947, ii, 778; 1948, i, 301) has deplored the fact that, whereas formerly the technique was limited to a skilled minority of workers, the technique is now open to a less experienced majority and the hazards are such that the technique is entering a dangerous phase.

Misuse

He expresses the view that there is no excuse for the use of an isotope technique when an ordinary chemical procedure would suffice. If isotopes must be used the selection should be of those without biological effect. For example, radiophosphorus (which is a negative β-particle emitter with a half-life of 14-30 days) should not be used in the treatment of patients in the reproductive period of life or with a life-expectation of more than 5 years.

Howarth considers the method quite unsuitable for general laboratories as the use of elements with long half-life (Co^{60}, 5.3 years; Sr^{89}, 55 days; Tn^{65}, 250 days) may lead to the accumulation of a dangerous level of radioactivity in benches, sinks and furniture.

The hazards of the technique have also been dealt with by Sullivan (*Chem. and Eng. News*, 1947, *25*, 1862) and the necessary precautions have been referred to by Kamen.

Techniques for following biological reactions involving essential mineral elements, whether they are required in quantity or in trace, have already been explored. Mineral elements investigated include iron, manganese and cobalt. Little is known about the function of cobalt in metabolism; but it is certain that an enlivened interest will be shown as a consequence of the recent demonstration that the anti-pernicious anæmia factor, Vitamin B_{12}, which has been referred to earlier in this review, is a cobalt co-ordination complex.

It remains to be seen how soon the tracer technique is used to elucidate the biological processes by which cobalt, ineffective against pernicious anæmia in itself, enters the Vitamin B_{12} complex for its vital rôle.

Iron, a deficiency of which can, as is well-known, lead to another form of anæmia; has also been labelled and its fate investigated by Hahn *et al.* (*J. Biol. Chem.*, 1943, *150*, 407). He demonstrated an exchange between the heme-iron of the blood cells and the crystalline iron-containing reserve protein, ferritin.

Ferritin is a complex of iron with the protein apoferritin which is present in marrow, spleen, liver and the stomach mucosa. The complex contains the high iron content of 23 per cent. By labelling, it has become possible to follow iron absorption, transport, storage and function.

Iron in the ferric state in food enters the gastro-intestinal tract where it is converted to the ferrous state by reducing agents during digestion. Absorption of ferrous iron occurs mainly in the mucosal cells and this stimulates the production of apoferritin, which combines with the iron to form the complex, ferritin. Regulation of iron absorption from the alimentary tract is maintained by the equilibrium between ferritin, plasma iron in the blood serum and ferrous iron in the mucosa. The level at which the concentrations of iron is held is fixed by oxidation-reduction equilibria (Granick, *Chem. Rev.*, 1946, *38*, 379).

Absorption Effects

This picture of iron absorption, which has been built up entirely with the aid of isotopic material, is in marked contrast with metabolic status which has been elucidated with other labelled substances.

In these latter cases there is a striking dynamic equilibrium and a constant interchange between cells, on the one hand, and, on the other, what is in the body and what has been presented to it. In the case of iron, if the body is already saturated with the element, no further uptake from the gastro-intestinal tract occurs. It has been shown that the administration of unlabelled iron a few hours before the administration of labelled iron prevents the absorption of the latter.

Metabolic Processes

McFarlane (*Brit. Med. J.*, 1948, *4567*, 164) draws attention to the fact that tracer studies have shown that bodily tissues are in an intense state of intracellular chemical activity which no metabolic balance sheet can demonstrate. But, by contrast, the nucleus of the adult cell is metabolically inert except in abnormal states. In malignant and regenerating tissues, the nucleus, however, plays an active part in the metabolic processes. (McFarlane has also reviewed the biochemical application of stable and radioactive isotopes before the British Association. (*Brit. Med. J.*, 1947, *4532*, 766).

The incorporation of isotopes in molecules is a chemical technique of basic importance. Bernstein and Taylor (*Science*, 1947, *106*, 498) describe a method of converting isotopically enriched carbon dioxide to carbon monoxide. Carbon dioxide with isotopic carbon may be readily obtained by the usual procedures and it is usually offered in the form of barium carbonate.

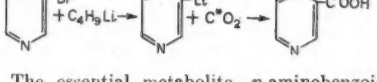
The value of isotopic carbon monoxide derives from its ready conversion to labelled methyl alcohol and labelled sodium formate which can in turn be used in synthesis.

The method of preparing this carbon monoxide depends upon an isotopic exchange reaction at 400° C. followed by separation by countercurrent thermal diffusion:—

$$C^{13}O + C^{12}O_2 \rightleftharpoons C^{12}O + C^{13}O_2.$$

In these syntheses carbon dioxide was obtained from barium carbonate containing 3 per cent carbon atoms as C^{13}.

For vitamin studies labelled nicotinic acid has been prepared by Langham *et al.* (*Science*, 1947, *106*, 277). Using *n-butyl* lithium and 3-bromo pyridine, 3-piridyllithium was obtained. This was carbonated with $C^{13}O_2$ and $C^{14}O_2$ from isotopic barium carbonate.



The essential metabolite, *p*-aminobenzoic acid, the elucidation of the rôle of which has played such an important part in the development of chemotherapy, may be prepared somewhat similarly by the reaction of *n*-butyl-lithium with *p*-bromaniline and subsequent carbonation with isotopic carbon dioxide.

(To be continued)

Dyewood Pioneers

Glasgow Company's Leadership

AN interesting event was celebrated in Glasgow last week by the British Dyewood Company, which, with its forebears, has been in operation for just over a century. Mr. E. L. F. Mucklow, the present managing director, is the third successive Edward Mucklow, and grandson of Edward Mucklow, who founded in 1842 the firm of Mucklow & Company, grinders of dyewoods and natural indigo, at Bury, Lancashire.

The period was one of rapid expansion in the Lancashire textile trade and within a short time the firm was producing a large range of natural dyestuffs and doing considerable business both in the U.K. and America.

Four Associates

In 1898, when the large textile combines were being formed, The British Dyewood & Chemical Company, Ltd., was floated as a public company, in which were amalgamated E. D. Milnes & Bros., of Bury, John Dawson & Company, Alloa, W.R. Scott and Company, Glasgow, and Mucklow & Company, Bury. The British Dyewood & Chemical Company, Ltd., was in turn succeeded by The British Dyewood Company, Ltd., in 1911.

By this date the British works had been concentrated in Glasgow and works had been opened in Jamaica to produce logwood extract. This was actively developed in its early stages by Mr. K. Campbell, the director who has been responsible for technical development in an association with the company lasting for more than half a century. From the logwood extract he devised a process for the manufacture or haematein, used principally in textile and leather dyeing. The drift of plant to the site of the raw material continued and, to keep the home plant in production, the extractions of myrabolans from India, sumac from Sicily, mimosa wattle bark from Australia and South Africa, and the manufacture of tannic acid for textile dyeing and calico printing, were successfully launched.

The end of the first world war again emphasised the need for new products and ultimately tannic acid, followed by gallic and pyrogallic acids and derivatives of pharmaceutical quality were quickly established.

Mr. Campbell's interests have, incidentally, extended beyond immediate concerns. He was the first to suggest the concentration of spent sulphite liquor from pulp paper works for use in the tanning industry. The magnitude of this business throughout the world to-day is the best evidence of the usefulness of this contribution.

Hydrogen Peroxide

Use in Wool Textile Bleaching

"THE application of hydrogen peroxide in woollen textile bleaching has an assured future," asserted Dr. K. W. Richmond in the course of a paper (prepared by himself and his colleague at Laporte Chemicals, Ltd., of Luton, Mr. Brian A. Standish) which he read to the Dublin Section of the Textile Institute, recently.

Hydrogen peroxide, he said, should not be regarded as for use only in good quality wool; it was now being used extensively for low quality wool, and this was important because wool treated with it ceased to be a low quality wool. He cited various advantages of its use. In the case of loose wool, he said, where the object of bleaching was to remove the yellow pigment from the fibre, there was, among other advantages, increased fastness to light.

"The use of hydrogen peroxide should be straightforward and satisfactory to all manufacturers," said Dr. Richmond, but there were, nevertheless, certain dangers, all of which could be obviated. It was, for instance, vital that brass, copper or bronze should never be used for tanks, nails, or studs in construction or repair of equipment used for hydrogen peroxide bleaching. Holes might be burnt in the fabrics bleached if these metals were used. The best material for the tank was stainless steel, but aluminium and lead were also satisfactory.

Monsanto's Five London Offices

Some reallocation has been made of sections of Monsanto Chemicals, Ltd., following the company's acquisition of additional accommodation at 8 Waterloo Place, London, S.W.1. The London offices are now located as follows: Registered offices, 8 Waterloo Place, S.W.1 (Telephone: Whitehall 2913. Telegrams: Monsanto, Piccy., London). All sales departments (excepting export) and Monsanto International, Victoria Station House, Victoria Street, S.W.1. (Telephone: Victoria 2255). Export sales department, Allington House, Allington Street, S.W.1. (Telephone: Victoria 2416). Central engineering department, 13-15 Maddox Street, W.1. (Telephone: Ambassador 3201.) Accounting and purchasing departments, 37 Park Street, W.1. (Telephone: Regent 7321.)

Textile Institute Annual Meeting.—Preston, birthplace of Sir Richard Arkwright, inventor of the spinning-jenny, has been chosen for this year's annual general meeting of the Textile Institute, on Wednesday, April 27.

DETERGENTS AND WETTING AGENTS

Great Expansion of Synthetic Products Foreseen

ONE of the most striking of recent developments in the field of applied physical chemistry had been the increased importance of wetting and detergency in industry, said Dr. E. S. Paice (Shell Chemicals, Ltd., London) in the course of a talk on "Detergents" to the Lancashire Section of the Textile Institute, in Manchester, on February 7. Reviewing the nature of surface active molecules, he observed that the oldest surface active agent, soap, had serious disadvantages. Its effect was partly nullified in hard water, due to the insolubility of the calcium and other divalent salts of the fatty acids.

The first important advance in the search for a wetting agent or detergent equal to or better than soap, but without its disadvantages, was the introduction of the sulphonated castor oil, or Turkey red oil. This product, more accurately called sulphated castor oil, was a complex mixture of compounds.

More recently, special methods had been developed for the treatment of fatty oils with sulphuric acid. Dr. Paice described alkyl sulphates, alkyl esters and amides, sulphonates, cation-active compounds, nonionic compounds, and passed to the industrial applications of surface active agents.

Textile Processing

The textile industry was pre-eminent among the industries in which surface active agents were used. The lecturer described the successful use of synthetic detergents in the worsted and woollen cloth industries in recent years. By far the most popular detergent had been derived from secondary alkyl sulphates of petroleum origin. Natural sulphated fatty alcohols, which were always likely to be more expensive than soap, had not made much headway in that particular field.

The non-ionic class of detergent, based on polyethylene oxide condensation products, had the advantage of not being adsorbed on the wool fibre. There was thus no loss of the detergent, and less critical limits of alkalinity were necessary.

With the secondary alkyl sulphates, adsorption definitely took place, resulting in a loftier and softer-handled product. In order to prevent this adsorption rate from becoming too high, scouring had to take place under alkaline conditions.

The use of synthetic detergents as auxiliaries in other processing operations of woollen goods was no less important, and perhaps the main development with synthetic detergents had been in the field of dyeing auxiliaries. Surface active agents were also used as wetting and penetrating agents in acid milling baths; in carbonising, where vegetable impurities in the wool were attacked by acids; and in soap milling, where they improved the lime soap dispersion and "handle" in subsequent scouring operation.

Synthetic detergents were of primary value in connection with wool and other animal fibres on account of the necessity for gentle treatment; but wetting agents were also very helpful in the cotton industry, particularly in kier-boiling. Surface active agents were also used in cotton processing because of their wetting action in improving levelness in dyeing operations.

Silk and Rayon

In the silk industry, the use of synthetic detergents was of particular value in the de-gumming process, where the natural gum was removed. Where dyeing was carried out as part of the same operation, the addition of synthetic detergents gave improved evenness, due to the removal of deposits of gum or lime soap.

Insoluble acetate dyes were often used to dye rayon goods, and maximum dispersion throughout the dyebath might be obtained by pasting the dyestuff with sufficient wetting agent—such as secondary alkyl sulphate—to provide a concentration of about 0.05 per cent in the final bath.

The laundering of woollens and silks called for the mildest possible conditions, and synthetic detergents had established their superiority in that field. It had not been found possible yet to obtain the same standards of soil removal with synthetic detergents as with normal soap processes.

Vast Increase

In the U.S.A. production of synthetic detergents had risen from 6000 tons in 1941 to 110,000 tons in 1947. The total pre-war American soap consumption was 1.5 million tons. In this country the pre-war consumption of soap for the domestic market was nearly 400,000 tons, and the development of synthetic detergents was expected to follow the American trend.

The modern development on a large commercial scale of a variety of synthetic detergents and wetting agents would have a very considerable impact on all industrial operations where wet processing was carried out.

German Potash Recovery

New and Widened Production in Several Chemical Fields

PROVISIONAL figures place the potash production in the Anglo-U.S. zone of Germany at 470,000 tons of K_2O for 1948, compared with a normal average consumption in this area of 530,000 tons a year, and further substantial progress is expected in 1949. In the British zone, which accounts for the larger part of the production, the output of crude potash salts in 1948 amounted to 2,410,000 tons and that of potassium chloride to 268,825 tons of K_2O.

There was a continuous improvement during the past year in the potassium chloride works, from 54,900 tons in the second quarter to 76,200 tons in the fourth quarter, equal to about 80 per cent of the estimated capacity.

Lack of Coal

The West Germany potash industry still complains that it is receiving inadequate supplies of fuel and electric power, and the efforts to repair damaged and worn-out plant are being held up by shortages of material. The recent measure of recovery has also made it manifest that the financial resources of the principal potash groups would not be adequate if full-capacity production were begun. But the most acute danger to the potash industry is the shortage of coal.

Since the price advance last autumn potash production in Germany has been profitable, but not so profitable as to enable the industry to bear the cost of putting idle mines and works into operation. The Salzdetfurth group expects shortly to resume production in the Sigmundshall plant at Bokeloh near Wunstorf, and Burbach to resume operations at the Koenigshall-Hindenburg mines, which have been out of production since 1938. Reopening of idle works and increased use of mechanical means of production would make possible a substantial increase in exports of fertiliser salts.

Penicillin

Following the commencement of penicillin production at Hoechster Farbwerke, Dr. Lachmann & Co., Hamburg, has announced plans for the commercial application of a new process said to resemble one successfully used in the U.S.A. Developed by Prof Lembke, Kiel, and Dr. Kreuzfeld, Hamburg, this "Submers" process greatly increases the yield of penicillin, compared with processes which rely entirely on surface growth. The firm hopes to produce 30,000 million international units a month, which compares with an estimated demand of some 500,000 million international units in Germany this year. The firm claims that the proposed price of DM 30 per mega-unit would make penicillin treatment of certain diseases cheaper than treatment by sulphonamides and intends to market penicillin ointment and powders. The well-known firm of Schering, Berlin, has also announced its intention to make use of the "Submers" process.

From South-West Germany it is reported that several important chemical and pharmaceutical works have engaged more workers. This applies in particular to Kali-Chemie AG, Heilbronn, Sunlicht AG, Mannheim, and Boehringer & Soehne, Mannheim. Th. Goldschmidt, AG, Mannheim, has not found it possible to carry out the necessary increase in hydrochloride acid production.

The production of cyanamide at the two West German works at Trostberg and Knapsack rose from 22,000 tons (N) in 1947 to 40,000 tons in 1948. In the agricultural year ending this summer Trostberg is to produce cyanamide, equivalent to 50,000 and 24,000 tons of nitrogen. These quantities are quite insufficient to meet current demand.

Underground Gasification

Gas Turbine Experiments in Alabama

PRELIMINARY arrangements are progressing for the second field experiment in the U.S.A. in underground gasification of coal, and the project will acquire additional significance because of the use of a gas turbine in the studies. The Bureau of Mines, which in collaboration with the Alabama Power Company is conducting research on a 300-acre tract near Gorgas, Alabama, have shipped to the site a gas turbine with a 23,000 cu. ft.-per-minute compressor capacity. It is intended to use it experimentally in burning the gaseous mixture from the combustion of coal at 60 to 100 ft. below the surface.

The first experiment with underground gasification was completed in the winter of 1946-47 by a similar Government-sponsored joint project of the Bureau of Mines and the Alabama Power Company. The present experiment entails more elaborate engineering preparations. This time, air will be blown underground to support controlled combustion in the coalseam.

If the resultant fuel gas burns well in the gas turbine power plant, it will establish the possibility of locating gas turbine electric power plants where coal exists and transmitting the output to urban industrial markets.

TRACER STUDIES OF FERTILISERS

Early Results of American Experiments

SOME further indications of the important body of data of fertiliser behaviour and plant nutrition which is expected to be made available by current studies employing radioactive tracer technique were presented in Washington last week by two scientists of the U.S. Department of Agriculture, L. A. Dean and S. B. Hendricks.

Initially, they recorded that as a result of investigations using isotopes of radioactive phosphorus, superphosphate and calcium metaphosphate were revealed as the most effective of the phosphatic fertilisers they employed.

Alpha tricalcium and dicalcium phosphate sometimes matched superphosphate and calcium metaphosphate, but in other tests they were far less effective.

Phosphate supplied by fertiliser was differentiated from that derived from the soil, by introducing into the test material radioactive phosphorus which differs from the normal element mainly in the fact that every now and then an atom decomposes and the decomposition can easily be detected. Half the radioactive phosphorus decomposes in two weeks and a marked fertiliser can be followed only for about six months. Only very small amounts of radioactive phosphate are required.

Varying Needs

Different crops vary in their uptake of fertiliser phosphorus. Wheat represents one extreme in that a high proportion of the phosphorus absorbed early in the growing period comes from the fertiliser. At the end of the season, however, it absorbs a very low proportion of its phosphorus from the fertiliser and takes most from that already in the soil. Potatoes, on the other hand, depend rather heavily on the fertiliser phosphorus throughout the growing period.

Part of the difference between these two crops is attributed to the type of root system. Only a relatively small amount of fertiliser phosphorus is actually used by plants. Less than 10 per cent is taken up by cotton, wheat, tobacco, or soyabeans, and low efficiency of utilisation emphasises the importance of fertiliser placement studies.

Dr. N. S. Hall, attached to the North Carolina Agricultural Experiment Station, reported that fertiliser placement studies with isotopes showed that the efficiency with which the applied phosporus is utilised can be varied by changing the manner of application. He illustrated the influence of the weather on the efficiency of placed phosphorus with the following example: At the Rural Hall Station in North Carolina, where the season was abnormally dry, the phosphorus placed as a side dressing at the time of the first cultivation was not utilised at all. In contrast, at the Oxford Station, with very favourable moisture conditions, the take-up of the side-placed fertiliser was as large as from that mixed in the plant row.

Continuing Research

Dr. Frank W. Parker, assistant chief of the Bureau of Plant Industry, Soils, and Agricultural Engineering, emphasised the need for development work to devise safe and effective methods and trained research men. "Much of the work for the next three to five years," he said, "will have to be of a developmental nature."

So far, he said, safe and effective procedures have been developed in the preparation of different radioactive phosphates and in using them in laboratory, greenhouse, and field experiments. The next radioactive elements to be used in field experiments, he said, would probably be calcium and sulphur—to determine the extent to which these elements from various sources are utilised.

Atomic Research

Advanced Equipment in the U.S.A.

DETAILS of two new machines being built at the Brookhaven laboratory, Upton, Long Island, New York, for the Atomic Energy Commission, were revealed at the annual meeting at Columbia University of the American Physical Society.

The director of the laboratory, Dr. M. G. White, stated that the cosmotron, one of the machines, will be used to bombard the nuclei of atoms with atomic particles at energies of 2500 m. to 3000 m. electron-volts or 10 times greater than the most powerful synchro-cyclotrons at present in existence.

The other machine, an electric furnace costing $20 million to construct, was described by Dr. Clarke Williams, a Brookhaven physicist. The intensity in the neutron radiation in the centre of the pile, the doctor said, was such that five trillion neutrons a second would pass through every square centimetre of surface exposed.

The cosmotron, it is expected, will add greatly to the understanding of high-energy particles. It is also thought that it will hasten the determination of the true nature of particles and possibly some yet unidentified.

American Chemical Notebook

From Our New York Correspondent

RECORD budgets, totalling $24 million, have been adopted for worldwide petroleum research during 1949 by the various Shell companies, it was announced this week by the Shell Oil Company in New York. Research is to be financed in all phases of operations, from seeking new sources of crude oil to improving fuels, lubricants, and chemicals. A substantial part of this amount will be devoted to advancing the broad basic research programmes carried on by the Emeryville, California, laboratories of the Shell Development Company. Aviation and agricultural research will be particularly stressed, says Mr. H. S. M. Burns, president of Shell Oil Company. The study of fuels and lubricants for jet engines will receive increased attention during the coming year. High priority also will be assigned to projects which will help grow more and better crops. At Modesto, California, the company maintains an agricultural laboratory and test farm which serves as a proving ground for oil-derived chemicals, including fertilisers, weed-killer, insecticides and fungicides. In a related field, greater emphasis will be given to the control of tropical insect pests. The company now employs about 4000 scientists and technicians in the research field alone.

* * *

New enamels for some alloys of aluminum to increase the durability and utility of the metal have recently been announced by the E. I. Du Pont Company as a result of six years' research in its electrochemical department. The new enamel is vitreous and is fired on aluminium sheets, strips and castings in furnaces similar to those used to supply porcelain to steel. The process is expected to increase the usefulness of the metal, particularly out of doors where it is subject to the corrosive effects of the atmosphere. Enamels for two alloys of aluminium, 61-S (wrought) and 43 (casting) have stood extensive tests, and are likely to prove satisfactory on other alloys. The resistance of these new enamels to acids and alkalis is comparable to that of enamel on steel, and the equipment employed is substantially the same as for that process. There is, however, a high percentage of lead in these new alloys, which renders them unsuitable for coating articles likely to come into contact with food.

Working under a U.S. Government contract, the University of Pennsylvania has developed a new instrument, the nitrogen meter, for the evaluation of oxygen supply systems. It is designed immediately for use in high altitude flying. Continuously recording the concentration of nitrogen in gas mixtures by photoelectric means, the meter is expected to find other applications in the field of analytical gas chemistry. In its present form, it measures a mixed gas sample of about 0.5 c.c. per second at one atmosphere, and has a delay interval between sampling and analysis of 0.1 second and a 90 per cent response interval of an additional 0.02 of a second. The sample from the system under analysis is caused to flow through an electrical discharge tube, whose light output varies with the nitrogen content.

* * *

A novel soldering iron which dispenses with the use of electricity or external heat is reported from New York. The iron is heated by means of a cartridge ignited in a manner similar to that of firing a bullet. The heat is created by the chemical mixture of certain metal powders similar to magnesium and an oxidising agent. It is stated not to be liable to spontaneous combustion and is alleged to be entirely safe to use. Working temperature is attained in five seconds and is maintained from six to eight minutes.

* * *

A new group of inexpensive wood-flour phenolic plastic moulding compounds for domestic and industrial uses has been developed by the (U.S.) General Electric Company. The compounds are said to be quite satisfactory for a majority of thermosetting applications. Flow characteristics, cure time, and water resistance are nearly equal to more costly wood-flour phenolics, but long-drawn mouldings will not have as high a gloss and may be less rigid.

* * *

The formation of a subsidiary company to take over the administration of the varied foreign interests of the Pennsylvania Salt Manufacturing Company was recently announced by the president, Leonard T. Beale. The new organisation will be called Pennsalt International Corporation. Richard L. Davis has been nominated president, and John H. S. Barr as vice-president.

A CHEMIST'S BOOKSHELF

Principles of High-Polymer Theory and Practice. Alois X. Schmidt and Charles A. Marlies. First Edition 1948. New York and London: McGraw-Hill Book Co., Inc. Pp. XII + 743. 45s.

In this important addition to the publishers' Chemical Engineering Series, the authors, both professors in chemical engineering at the College of the City of New York, present a comprehensive treatment of the fundamental principles, concepts, and practice applicable to all materials of high molecular weight, including plastics, rubbers, fibres, surface coatings, adhesives, and wood products. A broad co-ordinated approach is maintained throughout the book, thus fostering a basic understanding of the formation, properties, manufacture, development, fabrication, and application of high polymer materials. The text-book also demonstrates how the fundamentals of chemistry, physical chemistry, rheology, mechanics of materials, and manufacturing techniques may be applied universally to those materials, and comparison with metal products is stressed.

After introductory definitions and concepts, a few examples are listed in tables. The molecular forces are described and the terms *bonding* for primary valence forces and *bridging* for secondary intermolecular attractions are used. There is a comparison of rubbers, plastics and fibres and other sections deal with polymer formation and modification, structures, solubility and molecular-weight relations of high polymers. The chapter on rheology describes the mechanical behaviour of the various materials in terms of the three variables, stress, strain, and time, and how the rheological behaviour—*i.e.*, whether the materials are non-mouldable, thermoplastic, or mutaplastic—and gives practical information on problems facing the high polymer industries. How mechanical properties correlate with chemical composition, molecular and gross structure, and rheological behaviour, and the manner in which they are influenced by manufacturing procedure and external conditions, such as temperature and humidity, are explained in a later chapter.

The circumstances that high polymer products are electrical insulators and are easily moulded and fabricated are, of course, responsible for their very many electrical applications, and these and complex significant electrical properties are dealt with. Among the most useful of the other chapters are those devoted to various fibres, fibrous products, rubbers and adhesives and finally to resin product development, chiefly to phenolic resins.

The authors give very useful cross references throughout the text and bibliographies are appended to appropriate chapters.

Max Planck in His Academy Addresses. Memorial book by the German Academy of Science, Berlin, 1948. Akademie-Verlag. Berlin. Pp. 212; Dm.8.75.

This presents to those who take an interest in the life-work and personality of Max Planck (1858-1947) a selection of the numerous contributions with which Planck, as a member of the Academy and secretary of its Mathematical Scientific Division, enriched the Academy's work. They demonstrate the great share which Planck, Nobel prizewinner in 1920, had in the development of physics and of other sciences. The addresses of some other scientists and Planck's answers to them, which are included, complete the picture of his outstanding personality. The book contains a portrait of the subject and a facsimile of his handwriting. There is a bibliography with 242 references to his publications.

Sintered Iron and Steel (Sintereisen und Sinterstahl). By Dr. R. Kieffer and Dr. W. Hotop, Vienna: Springer-Verlag. 1948. Pp. X + 556. Price: Unbound, £4 3s. 6d.; bound, £4 7s. 6d.

Dr. Kieffer, one of the pioneer powder metallurgists of international reputation and recently organiser of the First International Powder Metallurgical Conference, Graz, presents this outstanding book with the assistance of his associates Dr. W. Hotop, H. J. Bartels and Eng. F. Benesovsky, all of whom are connected with the Metallwerke Plansee G.m.b.H., Reutte, Tyrol. The same author published in 1943 a book on powder metallurgy and sintered materials, which was soon out of print. Since then, so rapidly has the technical development of sintered iron

(*Continued at foot of next page*)

An Accurate Colour - Matching Unit

EXHIBITED at the Textile Institute, Manchester, for three days last week, was a new development in colour-matching. It is a unit composed of two blue fluorescent and two ordinary lamps, whose light is mixed and diffused through a Perspex screen.

Many shades of yarn appear so similar under normal light that the observer is often led to think that they are actually the same; and textile technologists, dyers and colourists find such units as that now displayed invaluable in separating fine shades.

In a lecture given in connection with the display, Mr. W. Harrison, a lighting specialist, said that in the textile industry both the grading of raw materials according to colour and the finishing of fabrics in the required colours had often to be made with a very high degree of precision.

Difficulties sometimes arose due to two phenomena of colour vision. Materials having different spectral reflection curves might appear to be the same colour to an observer having average colour vision, but would appear different to an observer with abnormal colour vision, and *vice versa*. A change in the quality of light under which the object was being seen could produce the same result.

Because of the established usage of daylight in colour work, it was generally accepted that the colours of materials in daylight were their "true" colours. Colourists knew that daylight varied considerably, and, to obtain the most constant and reproducible condition, it was the practice to work under north sky-light. Artificial daylight needed all the desirable features of natural daylight with the addition of constancy and it should be distributed as nearly as possible in the same manner as was natural daylight.

Mr. H. Hewitt, giving the companion lecture, quoted an essay written in 1786, in which John Wilson, a Manchester dyer, discussed the effect of changing daylight on the colours of the spectrum. Though there had been many changes since 1786, the variability of daylight had remained constant. In the field of artificial illuminants, vast improvements had been made, and the colourist of to-day could have at his disposal a reasonably good simulation of natural light.

When two contrasting hues were in close proximity, each appeared to become tinged with the complementary hue of the other. Neutral grey was the colour most favoured in textiles as a background for the colour-matching unit, since dark tones made light tones appear lighter, and *vice versa*.

A CHEMIST'S BOOKSHELF

(*Continued from previous page*)

and steel progressed, that he decided to devote himself to this special book on iron metallurgy. For this he was extremely well qualified by the wide range of his own research work and industrial experiences, which are thus published for the first time. Moreover, the results of the rapid growth of research and application of sintered materials abroad have only lately become accessible and have allowed a much more comprehensive presentation of the whole subject, including foreign literature and patent indices. The book covers all aspects of the special field, the industrial processes and techniques, the products, and the various problems in the production of sintered iron and steel, the underlying theories and other essential details, which are seldom available in a specialised technical work. The book thus reviews many of the past, as well as contemporary, developments of this comparatively modern industry and points them with the comment and observations of an expert.

The work consists of two main parts, of which the first deals with raw materials and working methods of iron-powder metallurgy, and the second with sintered iron and steel as works materials. The eight chapters of the first part deal with the modern fundamental principles, terminology and theory, viz., historical development; production and properties of the sintered powders; pressure and sintering methods; multiple pressing; simultaneous application of pressure and heat; and technological planning. The five chapters of the second part are devoted to the varying properties of cast and sintered materials and their testing; materials based upon the porosity of sintered iron; castings for various parts of machines and apparatus; application of the sintering process to iron and steel alloys with special physical and chemical properties; and sintered alloys of iron, with several elements of the periodic system.

The book is profusely illustrated with 264 text figures and contains an unusually complete literature survey. An appendix contains a list of powder-metallurgical terms, which it is suggested might serve as a basis for a standardisation of metal powders. This is the most stimulating work on this subject that has yet appeared, deserving the careful study of powder metallurgists.

PACKAGING CHEMICALS

Problems of Differing Weights and Descriptions

SOME of the multiplicity of problems affecting packaging in the drug and fine chemical industry were the subject of a paper and discussion at a meeting of the Institute of Packaging in London, last week.

The paper was read by Major K. M. Cave (British Drug Houses, Ltd.), who also brought specimens of bottles with varying forms of closure, ampoules, etc., to illustrate some of his points.

Dealing first with pharmaceutical requirements, he observed that 3000 substances had to be dealt with; he deplored the language difficulty, and the use of "mystic symbols" for prescriptions. Since the National Health Act the greatest increase had been in sedatives.

In analytical chemistry there were some 8000 substances in general use, which had to be supplied and listed in various grades, with specific demands from certain countries, and sold in bulk for industrial use.

There were some 2000 pills and tablets sold by weight, volume and measure, and 700 injections. Unnecessary difficulties were caused by varying systems of weights, and the speaker thought it was a pity that the world could not concentrate on the universal adoption of the metric system.

Labelling presented one of the most irritating problems of present-day packaging. Bad enough were the requirements in this country, where regulations were likely to be altered every three months, but abroad it was even worse, so frequent were the changes, and even the size and face of type were laid down.

Bottle Closures

Dealing with some of the problems associated with bottle closures—metal, glass, rubber, cork, or plastic—he noted that plastic caps had been found in many ways to be the best. There was no fear of rust, but they tended to loosen, and required elastic tape binding.

He challenged glass manufacturers to produce glass stoppers as good as those that came from Germany before the war.

Acids provided one of the major problems, the packing regulations necessitating some material to prevent breakage and to soak up and kill any acid which might be released. The lecturer exhibited a sample mixture of chalk and sawdust which had been found best for hydrochloric and sulphuric acids. For nitric acid, pure chalk was necessary, but this tended to form a hard sheath round the bottles, causing breakage if the case got knocked. Kieselguhr mixed with the chalk tended to prevent this hard caking, but the speaker suggested that anyone finding a substance that could be mixed with chalk to make it resilient would be well rewarded.

Containers for hydrofluoric acid were a special difficulty. Two bottles were shown round, one of gutta percha which costs only 6s., but the better one was a polythene bottle which cost 10s.

Ampoules came next, and a good deal of labour was involved in polishing by hand. There was danger of the glass flying when cutting.

In subsequent discussion, a speaker suggested that if the fine chemical industry was really dissatisfied with the glass of ampoules, which were made to a British Standards specification, it was up to members of the industry to ask the British Standards Institution to revise its standard. There seemed to be a general opinion that on packaging as a whole a good deal more standardisation could profitably be achieved.

PURCHASE TAX RELAXATION

A NEW order by the Treasury (The Purchase Tax (No. 1) Order, 1949, exempts from Purchase Tax certain drugs and medicines for dispensing, and which the Commissioners of Customs and Excise are satisfied will be used only for that purpose.

The exemption will apply on or after May 2, 1949. The goods must be in a container on which the official name of the substance is given, and it must be satisfactorily shown that they will be supplied only to authorised sellers of poisons, hospitals, infirmaries, health centres, clinics, dispensaries, etc., at which human ailments are treated, and dental surgeries.

Details are also set out regarding supplies to other persons registered for tax; wholesale chemists registered for tax; supplies to persons not registered for tax, and irregular retail disposal.

Fertiliser Controls Revoked

The Board of Trade announces that an order has been made, the Control of Fertilisers (Revocation) Order, 1949, effective from January 27, which revokes the remaining orders controlling the production, distribution, acquisition and disposal of fertilisers.

Keener Competition for African Markets

Manufacturers Preoccupied with Price and Currency Problems

THE great recent expansion in paint manufacturing resources in South Africa and heightened pressure from overseas exporters are setting up competitive conditions in the local markets. This was recognised by Mr. H. D. Evans, presiding at the annual meeting of Herbert Evans & Co., in Johannesburg. He commented on this increasing competition, which he attributed to the importation of paints, particularly from the U.S.A., and the growth of South African production. In spite of this competition, he said, the company's turnover continued to be satisfactory, and the net profit for the year was £145,390, of which taxation absorbed £39,300. Some reduction in oversea competition was anticipated as the result of the new exchange control.

* * *

Import control is a subject which continues to figure prominently in the speeches of chairmen of companies which had been in the habit of making considerable purchases in hard currency countries. Presiding over the 13th annual meeting of the S.A. Druggists, at Johannesburgh, Mr. H. L. Karnovsky said that, owing to these restrictions, the importation of merchandise, raw materials, plant and machinery, which the company had drawn mainly from the United States and Canada, would become more difficult. Though the company's quota had been exceeded, the authorities had given an assurance that its requests for permits to import essential commodities would receive sympathetic consideration. Commodities required for the medical profession, hospitals and clinics and the mining industry would still be made available. For the first time the company's sales exceeded £2 million, but, owing to the fact that many overseas organisations had opened depots in the Union, the profit margins had been narrowed.

* * *

Dr. C. Maunder-Foster has been in charge at Port Elizabeth of the layout and building of the BB Chemical Co.'s new factory at Neave Industrial Township. This is a branch of the company in Leicester, England. The local factory will make for the South African market chemical requirements of the shoe and leather industries, including pigments, latex adhesives, dressings, and in addition industrial adhesives and sealing compounds, especially for the building, clothing and motor industries.

Experiments with Antrycide, the new anti-nagana (sleeping sickness) serum are being carried out in tsetse-infected areas of Zululand. Tests are being made with supplies of the drug given to the Union Division of Veterinary Services of the Department of Agriculture by Imperial Chemical Industries, Ltd. Dr. de Kock, Director of Veterinary Services, said that time was necessary to prove the efficiency of the drug and it was difficult to draw conclusions as to whether it would have the desired effect under different bio-climatical conditions, for instance, during a period of drought. The policy of the Union Government, however, had been to eradicate the tsetse fly by spraying DDT and BHC in the 7000 sq. miles of the fly belt, situated chiefly in Zululand. In the Mkuzi Game Reserve, where once catches of up to 9000 flies had been registered in one trap, no fly had been caught for some months.

* * *

The possibility of a shortage of matches faces the Union in a few months if the import control restrictions on raw materials are not relaxed, according to the chairman of a company controlling three match factories in South Africa and one in Southern Rhodesia. Before the war, match factories in the Union got much of their timber from the Baltic States; now these sources of supply were closed to them. They had to import what they could get from Canada, and it was not yet known how the volume of imports would be affected by import control. Many of the chemical ingredients required had to be imported. The South African demand for matches was now greater than ever. There had been criticism of price compared with imported matches.

* * *

Stage two of the Union's rainmaking experiments will begin before the middle of the year. The experiments are a co-ordinated effort by the Government Meteorological Office, the Council for Scientific and Industrial Research and the South African Air Force. The first stage was completed last April when dry ice was sprayed into cumulus cloud and produced early precipitation. The second stage will be to determine under what conditions the "seeding" of a cloud with dry ice is most effective. The scientific investigator said that overseas developments were followed closely and their application under local conditions studied.

Home News Items

Purchase Tax Remission.—The Commissioners of Customs and Excise have decided that cast-iron coal saver grids used in the firespaces of stoves and ranges for substantially reducing the fuel capacity, will be exempt from Purchase Tax.

Birmingham's New Synchrotron.—Work on the Birmingham University synchrotron has now reached the constructional stage. The main steelwork of the magnet, weighing 800 tons, was erected during the war. The synchrotron will accelerate protons of energies of 13 million electron volts.

New Industry.—Sir Stafford Cripps is to visit Wolverhampton on February 25 to open a new factory erected by the Goodyear Tyre and Rubber Co., Ltd., for the manufacture of Pliofilm, a transparent rubber film used for wrapping. The factory, covering an area of 22,400 sq. ft., adjoins the tyre factory at Bushbury.

Textile Conference.—"The Industrial Application of New Knowledge" will be the subject of the Textile Institute's annual conference to be held in Dublin from May 24 to May 27. Papers to be presented by textile technologists and scientists and a number of students of textile technology will again be invited as guests of the Institute.

Nomenclature of Metallic Finishes.—A new British Standard (B.S.S. 1448: 1948) to define the nomenclature of decorative metallic finishes. Three characteristics, the nature of the surface, the colour, and the relief of colour, are defined. Symbols have been chosen by means of which each finish may be clearly defined.

Industrial Teams to Visit U.S.—Difficulties as to who should be eligible to join the teams which are to visit American factories have now been settled by the British side of the Anglo-American Joint Council on Productivity. It was agreed that workers' representatives should be trade unionists and that applications would be considered from non-federated firms.

Coal Output Up.—The production of deep-mined coal in Britain last week was 10,100 tons less than the previous week. Open-cast coal output, however, more than made up the deficiency with an increase of 13,100 tons, thereby raising the combined production by 3,000 tons. Comparative production figures are.—Last week: 4,301,400 tons (deep-mined 4,080,300 tons; open-cast 221,100 tons). Previous week: 4,298,400 tons (deep-mined 4,090,400 tons; open-cast 208,000 tons).

Long Service Awards.—Watches and clocks were recently awarded to employees in the Scottish factories of Imperial Chemical Industries, Ltd., Nobel Division, in recognition of their having completed 20, 30, and 40 years' service.

Scottish Autumn Exhibition.—The Scottish chemical industry is represented in the list of applications for space in the Scottish Industries Exhibition, which is to be held in Glasgow from September 1-17. Nearly half of the exhibition space is stated already to have been allocated.

Flexibox Moves.—Flexibox, Ltd., mechanical engineers and manufacturers of Flexibox mechanical seals for rotary pumps and compressors, has recently moved to new works and offices in Nash Road, Trafford Park, Manchester, 17, about a quarter of a mile from their previous location. The new workshops, completed this month, include considerably increased production facilities.

Preventing Pollution.—Immediate steps by Merseyside local authorities to end the menace of river pollution were urged on February 1 at a meeting of the Rimrose Brook Drainage Board. The view was expressed that, sooner or later, the problem would be taken up at Government level, and the disposal of sewage direct into rivers would be prohibited. For many years the shores of the Mersey had been a disgrace.

BOC Welding Prize.—A prize of £100 is again offered this year by the British Oxygen Company for the best paper not exceeding 5000 words in length on a research in welding or its application, carried out in Great Britain or Northern Ireland. Candidates must not be older than 35, and their (unsigned) papers must reach the secretary, the British Welding Research Association, 29 Park Crescent, London, W.1, on or before September 30, 1949.

Essay Competition.—A prize of three guineas for the best essay of not more than 3000 words has been offered by The British Oil and Cake Mills, Ltd., to all juniors (i.e., under 25 years of age) interested in the paint and allied trades, and who are domiciled in the Manchester area. The award has been left to the discretion of the Manchester section committee of the Oil and Colour Chemists' Association. Essays (in writing) should be submitted to D. M. Wilson, c/o D. Anderson & Son, Ltd., Park Road Works, Stretford, Manchester, not later than Friday, March 18. Membership of O.C.C.A. is not a condition of entry.

D

Personal

BRITISH Celanese, Ltd., has announced the appointment as directors of the new subsidiary to control export business, British Celanese (Overseas), Ltd., of MESSRS. G. H. SPILMAN (chairman), R. T. ARCHER, W. F. ARCHER, A. T. BRENCHLEY, C. H. COLTON, W. A. DICKIE, G. DONNELLY, T. P. JENNISON and M. SPILMAN. Mr. G. H. Spilman, Mr. Colton and Mr. Dickie are directors of the parent company and the others have been associated with the export side of the parent company's business for many years.

The General Electric Co., Ltd., announces the appointment of MR. O. W. HUMPHRIES as manager of the company's research laboratories at Wembley, Middlesex. Mr. Humphreys joined the staff of the laboratories in 1925, and was appointed to its leading scientific staff in 1927, originally in charge of the heat group. In co-ordinating the work of the laboratories, which now employ over 1300, Mr. Humphreys will be helped by a small advisory scientific panel, of which Dr. B. P. Dudding has been appointed vice-chairman.

MR. W. K. B. MARSHALL, B.Eng., A.I.M., is the newly appointed assistant director of research of the British Welding Research Association. He was formerly for some years works metallurgist at the Milton Works of the British Aluminium Company and for the past eight years has been the chief metallurgist and later chief development engineer to the A.P.V. Company, Ltd. He is expected to take up his duties on March 1 and will pay special attention to light alloy and stainless steel welding.

MR. ANTHONY WEDGWOOD BENN (elder surviving son of Viscount and Viscountess Stansgate), who is at present on a business mission to the United States and Canada on behalf of Benn Brothers, Ltd., proprietors of THE CHEMICAL AGE, is shortly to marry Caroline, elder daughter of Mr. and Mrs. J. M. De Camp, of Hyde Park, Cincinnati, Ohio. The marriage will take place in America.

MR. ALEXANDER JOHNSTON, M.P., managing director of the North British Rubber Co., Ltd., has been appointed chairman. Other appointments include MR. DOUGLAS H. GORDON, director in charge of production, and MR. LEIGHTON SMITH, acting sales manager, northern division, with headquarters in Edinburgh.

MR. M. J. P. DAVIES, manager of the Blackley (Manchester) works of the I.C.I., dyestuffs division, has retired. He was one of the men who strove to keep British dyestuffs pre-eminent after the 1914-18 war. MR. S. ROBERTS, his successor, was a laboratory assistant at Blackley 30 years ago.

MR. T. W. OMAN, of W. T. Geddes & Co., oil merchants, 142 Queen Street, Glasgow, is the new vice-president of the Glasgow Chamber of Commerce. He was convenor of the Chamber's Paint and Oil Section from 1940 to 1945 when he was elected a director.

MR. ROBERT YOUNG PARKINSON, formerly sales manager of Ribblesdale Cement, Ltd., has been appointed as a special director to deal with sales policy.

MR. REGINALD MURDIN DRAKE, joint manager of the ABCM, who died intestate on November 21 last, left £2120 gross (£1768 net).

Oil Consumers' Council

Names of the chairman and members of the Oil Consumers' Council, set up by the Ministry of Fuel after the dissolution of the Petroleum Board, have now been announced. Chairman is Sir William Palmer, chairman of the British Rayon Federation. He was formerly principal industrial adviser to the Board of Trade.

Members include Mr. C. M. Merrick, managing director and general manager of Shell-Mex and B.P. and chairman of the United Kingdom Petroleum Industry Advisory Committee, and Mr. L. Sinclair, director of the Anglo-American Oil Company. The secretary is Mr. F. E. W. Barnett, Ministry of Fuel and Power. The appointments are for three years.

Obituary

DR. CYRIL DUSTAN, a research associate of the Columbia University School of Public Health and a leading expert on beryllium, has died at his Brooklyn home. He had just completed for the Atomic Energy Commission a year's study on the health hazards associated with the handling of beryllium. A report on the medical aspects of beryllium poisoning had also been prepared by Dr. Dustan. He had planned to leave shortly to join the health and safety committee of the Tennessee Valley Authority for allied research.

Overseas News Items

More Guiana Bauxite.—Bauxite exports from British Guiana in the year ended September 30, 1948, were 1,448,654 tons, an increase of 520,102 tons over 1947.

Guatemalan Petroleum Institute.—Guatemala has decided to establish a National Petroleum Institute, which is, *inter alia*, to investigate the possibilities of fuller oil production and refining in that Republic.

Northern Rhodesia Copper Refinery.—An electrolytic copper refinery is to be established by the Mufulira Copper Mines in Northern Rhodesia. The plant will have an initial capacity of 36,000 long tons of electrolytic copper per annum and is expected to cost about £1.5 million.

Italian Chemical Progress.—Gradual recovery in the Italian chemical industry is indicated by the figures issued by the Central Statistical Institute. Nitrogen, synthetic ammonia, sulphuric acid and calcium carbide all show considerable increases, but owing to the continuing building crisis, there has been no progress in colour production for paints.

Oldest U.S. Pharmaceutical Manufacturer.—The Tilden Company, New Lebanon, N.Y., which claims to be the oldest U.S manufacturer of pharmaceutical products, is celebrating its 125th anniversary this year. The company, which started in 1824 with a handful of products, now produces more than 300 pharmaceuticals in large premises.

Vinyl Chloride in Germany.—Chemische Werke Huels, North Rhine-Westphalia, in the bizonal area of Germany, is manufacturing vinyl chloride on an experimental basis and may have enough stock to produce polyvinylchloride in 1949, which would help to meet the increased demand for the latter from the plastics and electrical-equipment industries. The company has also begun production of butyraldehyde, an important plasticiser.

Australian Rare Metals Development.—A new company, New Metals Australia, Ltd., which is directed by a woman, Dr. Deborah Buller Murphy, operating on the Pilbara field, 80 miles from Port Hedland, Western Australia, will develop rare metals, including titanium, tantalum, beryllium, and caesium. Dr. Buller Murphy became interested in the study of rare metals when her father, who was Surveyor General of Western Australia, brought home specimens from the field. During the war, mines under her control supplied the Allies with tantalite and beryllium.

Chile Nitrate Prices Increased.—The Chilean price of nitrate of soda has been increased by (U.S.) $3 per ton, to $51 per ton of 2000 lb. and to $54.50 per ton packed in paper bags of 100 lb.

Spanish Ore for Germany.—As part of the Marshall plan allotments announced recently, the Economic Co-operation Administration has approved the purchase from Spain of $1.9 million worth of metallic ores for use in recovery operations in Western Germany.

More Polish Lignite?—Exploratory drilling by the Polish authorities in Lower Silesia are said to have resulted in the discovery of important lignite deposits. An expert commission has been appointed to examine the new deposits and to report on the possibilities of commercial exploitation.

Brazilian Cement Project.—The Brazilian Mineral Production Department of the Ministry of Agriculture is prospecting in the States of Bahia and Alagoas for limestone and other raw materials required for the manufacture of cement, in pursuance of the large Sao Francisco Valley development project for cement industry.

Pakistan to Exploit Coal.—The services of a British firm are to be engaged by the Government of Pakistan to survey existing collieries, and, it is expected, will submit its recommendations for a production plan for the next ten years, making suggestions for a more scientific exploitation and grading of Pakistan coal.

Canada's Mineral Output.—A preliminary estimate of the value of Canada's mineral output for 1948 indicates a record high level of $806 million, or 25 per cent more than in 1947. The highest increase was registered by fuels, the output value of which rose by 43.7 per cent. Coal production at 18 million tons was 500,000 tons below the record of 1942, but striking developments in the Leduc oilfield brought crude oil output up to a new high level of 12 million barrels.

Japanese Production Increase.—Heavy rains which increased the hydro-electric power output in Japan resulted in increased production of ammonium sulphate and calcium cyanamide in the third quarter of 1948, according to a U.S. Department of Commerce report. An additional allocation of coal in November was expected to increase capacity of the ammonium sulphate plants using the gas process. Production of DDT concentrate in October was higher than the previous month, partly due to the addition of a fourth manufacturer.

Next Week's Events

MONDAY, FEBRUARY 14

Society of Chemical Industry. (Plastics Group). Preston: Victoria and Station Hotel, 6.30 p.m. Joint meeting with the Preston and District Section, I.R.I., the R.I.C., and the B.A.C. Dr. W. J. S. Naunton: "Natural and Synthetic Polymers."

Royal Institute of Chemistry. Birmingham. Joint meeting with I.R.I. Prof. H. W. Melville: "Degradation of High Polymer Substances."

TUESDAY, FEBRUARY 15

Society of Chemical Industry. (Chemical Engineering Group). London: Geological Society, Burlington House," W.1, 5.30 p.m. Prof. T. R. C. Fox: "Technical Education."

Hull Chemical and Engineering Society. Hull: Church Institute, Albion Street, 7.30 p.m. J. P. Stoneman: "The Newer Synthetic and Regenerated Fibres."

WEDNESDAY, FEBRUARY 16

Society of Chemical Industry. (Plastics Group). London: Waldorf Hotel, Aldwych, W.C.1. 6.30 p.m. Joint meeting with London Section, Plastics Institute. Dr. H. M. Stanley: "Petroleum Hydrocarbons as Raw Materials for the Plastics Industry."

Institution of Structural Engineers. Manchester: College of Technology, 7.0 p.m. H. A. Cadwell: "New Regulations for the Design of Welded Structures."

Manchester Metallurgical Society. Manchester: Engineers' Club, 6.30 p.m. A. W. Hothersall: "Electro-deposition for Engineering Purposes (not decorative)."

Royal Institute of Chemistry. (London and South-Eastern Counties Section) London: 30 Russell Square, W.C.1, 6.30 p.m. Dr. G. M. Bennett: "The Work of the Government Laboratory."

Institute of Welding. London: Manson House, W.1, 7.0 p.m. Dr. D. V. N. Hardy: "Silicones." (North London Branch). Acton: Technical College, 7.30 p.m. A. T. C. Burrows: "Conveyors."

Institute of Fuel. (Yorkshire Section). Leeds: University, 2.30 p.m. J. R. Joyce: "Atomisation of Liquid Fuels for Combustion."

The Pharmaceutical Society. London: 17 Bloomsbury Square, W.C.1, 7.30 p.m. T. C. Denston: "The National Formulary, 1949."

Royal Statistical Society. (North Eastern Group). Newcastle-on-Tyne: Newcastle Chemical Industries Club, Lovain Place, 6.30 p.m. E. D. van Rest: "Probability and the Experimenter."

British Association of Chemists. Manchester: Engineers' Club, 7.0 p.m. J. Wilson: "Industrial Research Organisations."

THURSDAY, FEBRUARY 17

The Chemical Society. London: Imperial College of Science and Technology, S.W.7, 7.30 p.m. Dr. V. Prelog (Zurich): "Recent Developments in the Chemistry of Macrocyclic Compounds." North Wales: University College, Bangor, 5.30 p.m. Dr. W. H. J. Vernon: "Corrosion: The Study of Surface Reactions on Metals." Sheffield: University, 5.30 p.m. Prof. W. F. K. Wynne-Jones: "Hydrogen Peroxide as an Ionising Solvent."

Textile Institute. (Lancashire Section). Manchester: 16 St. Mary's Parsonage, 7.15 p.m. A. W. Bayes: "The Function of Testing in Production." (Burnley Branch). Burnley: Mechanics' Institute, Manchester Road, 7.15 p.m. A. M. Robertson: "Fibreglass and its Uses." (Irish Section) Belfast: College of Technology, 7.30 p.m. M. H. Wilkinson: "Modern Scouring and Bleaching in the Textile Industries."

Institute of Fuel. (East Midland Section). Nottingham: Gas Demonstration Theatre, 6.0 p.m. Prof. A. L. Roberts: "Clay Minerals, their Properties and Industrial Uses."

The Royal Society. London: Burlington House, W.1, 4.30 p.m. S. P. F. Humphreys-Owen: "Crystal Growth from Solution." D. Gabor: "Microscopy by Reconstructed Wavefronts."

FRIDAY, FEBRUARY 18

The Chemical Society. Glasgow: Royal Technical College, 7.0 p.m. Local annual general meeting.

Institute of Physics. Manchester: University, 7.0 p.m. F. P. Bowden: "Friction."

Society of Dyers and Colourists. Manchester: Gas Department Showrooms, 6.30 p.m. F. W. Thomas: "Drying of Textiles."

Society of Glass Technology. St. Helens: Gas Showrooms, 7.15 p.m. W. J. R. Merren: "The Application of Electronics in Glass Manufacture and Glass Research."

Institute of Metals. (Birmingham Local Section). Birmingham: James Watt Memorial Institute, Great Charles Street. All-day symposium: "Techniques of Metallurgical Investigation."

SATURDAY, FEBRUARY 19

Royal Institute of Chemistry. (London and South-Eastern Counties Section). Reading: University, 3.0 p.m. Prof. F. E. Simon: "Experiments on Solid Helium."

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsibe for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

OMEGA PLASTICS, LTD., London, E.C. (M., 12/2/49.) December 23, by order on terms, £561 11s. 11d. debenture, to G. R. Calcutt, London, £231 12s. debenture to R. F. T. Edwards, London; and £301 12s. debenture, to P. G. Brown, London; general charges.

VISCOSE DEVELOPMENT CO., LTD., Bromley (Kent). (M., 12/2/49.) December 21, trust deed dated December 14, 1948; securing first debenture stock limited to £135,000, present issue nil; charged on lands at Woldham Road, Bromley (Kent), South Dock, Swansea, and to west of West Pier, Swansea, with factory buildings, etc., on said lands with plant, fixtures, etc., as comprised in conveyances dated May 11, 1917, December 23, 1918; April 26, 1926 and April 22 and 30, 1947. *Nil. April 15, 1948.

Satisfactions

H. J. ELLIOTT, LTD., Pontypridd. (M.S., 12/2/49.) Satisfactions December 29, of debentures registered October 24, 1941, and December 23, 1942.

MIDLAND METAL DIECASTING, LTD., Wolverhampton. (M.S., 12/2/49.) Satisfaction December 29, of debenture registered January 23, 1935.

TUNGSTEN MANUFACTURING CO., LTD., London, S.W. (M.S., 12/2/49.) Satisfactions December 31, of debentures registered January 6, 1943, and September 2, 1947.

Company News

The prospectus was published this week of an issue of 360,175 4½ per cent cumulative preference £1 shares at par and of 285,700 10s. shares at 14s. in **George Kent, Ltd.**, manufacturers of meters and industrial instruments. A profit of £154,179 was earned in 1947-48, and it is estimated that profit for the following six months was £100,000.

The name of **Milled Metals, Ltd.**, has been changed to **Wolstenholm Bronze Powders, Ltd.**

New Companies Registered

B. C. Laboratory Equipment, Ltd. (463,724). Private company. Capital £1000. To acquire the business of sheet metal workers and laboratory furnishers, carried on as Barco and Co. Directors: L. D. Barringer. G. F. Cooper. Reg. office: 14a Selborne Road, Hoe Street, Walthamstow, E.17.

British Industrialists' Association, Ltd. (463,820).—Private company. Capital £2500. Objects: To promote, preserve and protect, so far as legally practicable, the principle of private enterprise in trade and industry, and oppose or further opposition to the nationalisation of any trade or industry, or any development considered likely to prejudice private trading. Solicitors: Allen & Overy, 3 Finch Lane, E.C.3.

Erinmore Chemicals, Ltd. (12,741). Private company. Capital £2000. Soap and candle makers, etc. Subscribers: S. Kerr, 67 Dame Street, Dublin, and E. Reilly.

S. R. Hirst & Co., Ltd. (463,711). Private company. Capital £5000. Manufacturers of chemicals, fertilisers, leather, textiles, etc. Directors: S. R. Hirst, K. Hirst, B. Hirst and N. Buckley. Reg. office: Speedwell Mills, Tansley, near Matlock.

Oxirane, Ltd. (463,923). Private company. Capital £30,000. Manufacturers of chemicals, gases, disinfectants, fertilisers, etc. Solicitors: Hardman Phillips & Mann, 10 Norfolk Street, W.C.2.

Rustons Chemists, Ltd. (463,987). Private company. Capital £20,000. Manufacturing chemists, etc. Directors: Dr. H. E. Gleave, E. A. Wiseman, H. J. Clarke. Reg. office: 31 Bletchley Road, Bletchley, Bucks.

Technopol Laboratories (Eire), Ltd. (12,708). Private company. Capital £500. General manufacturing and research laboratories, etc. Subscribers: M. Lamb, 116 Merrion Road, Dublin, and D. Isaacson.

T. Wilson (Nottingham), Ltd. (461,487). Private company. Capital £7000. Manufacturing chemists, etc. Directors: F. W. Shepherd, D. R. Shaw and Mrs. C. Shepherd. Reg. office: 81 Willoughby Street, Lenton, Nottingham.

Chemical and Allied Stocks and Shares

STOCK markets were upset at the beginning of the week by the Wall Street reaction and by uncertainty as to the outlook for commodity prices. Oil shares declined by as much as 5s. on Monday, copper shares fell sharply and other base metal mining groups receded, while rubber

shares eased, and falls in leading industrials ranged down to 1s.

There was no heavy selling, but with buyers showing caution because of international political news, a little selling had a disproportionate influence. British Funds were relatively steady, although short-dated stocks reflected switching into long-dated stocks, such as 3 per cent Transports.

Chemical and kindred shares have reflected the prevailing trend, and in some cases sharp declines were recorded compared with a week ago. As usual, when markets are unsettled and uncertain, leading and widely-held shares have been most affected. Imperial Chemical, for instance, have fallen to 46s. 3d. at the time of writing, while Turner & Newall, after their recent rise, came back to 85s. 9d.; Dunlop Rubber receded to 75s. 6d.; Courtaulds to 37s. 9d.; and British Celanese to 20s. 6d. The lower prices are, however, attracting buyers.

Monsanto Chemical remained steady at 62s. 6d.; Fisons have moved up to 59s. 9d.; Albright & Wilson were 31s., while Amber Chemical 2s. shares were 9s. 6d. and William Blythe 3s. shares held their rise, changing hands over 22s. Laporte Chemical 5s. units were 21s., but in other directions, De La Rue eased to 41s. after an earlier rise. British Industrial Plastics 2s. shares were 6s. 9d. and British Xylonite steady at £5¾. Borax Consolidated at 63s. 9d. remained firm on market talk of a possible increased payment from profits on investment sales or income from other special sources.

At 51s. 6d. British Aluminium eased after a further small rise. British Oxygen at £5¼ were unaffected by market talk of an increase in capital later in the year. Glaxo Laboratories at £23 have held steady at the time of writing, the prevailing view being that when the Bonus Tax is removed or modified, there is likely to be a bonus of some kind for shareholders. British Match (35s. 3d.) were also steady.

Colliery shares were lively on the decision as to how the global compensation sum is to be spit up between the various colliery districts. The awards for Scotland and South Wales were slightly higher than expected, and shares such as Powell Duffryn (30s. 6d) and Fife Coal moved in favour of holders.

On the other hand, shares of concerns in the midland areas showed some sharp declines. It will, however, be two years or more before the compensation for each company is finally decided. District valuation boards have to be appointed and companies not satisfied with decisions of the latter can appeal. Reprieve of their non-steel assets from nationalisation put Guest Keen up to 50s., while Staveley rose to 90s. 6d.

Among oils, Anglo-Iranian fell 5s. to £8 13/16, Shell were 2s. 6d. down at 73s. 1½d., and Ultramar at 34s. 4½d. came back sharply after touching 36s. 3d.

British Chemical Prices

Market Reports

A STEADY demand has been reported from almost all sections of the chemicals market, with contract deliveries to the chief home consuming industries moving with fair regularity. The call for shipments to the Dominions and Colonial markets continues to cover fair volumes and the overseas demand generally remains good. Activity is helped by the steady improvement in the supply position of most of the soda products and firm delivery dates are now more readily offered. British-made barium chloride is in good request and a steady inquiry for blanc fixe is reported. Buying interest in formaldehyde is well maintained at firm rates and hydrogen peroxide continues in strong request. There has been a fair turnover in solvents and prices are holding, while there is no difficulty in finding an outlet for offers of lead and copper compounds. The coal-tar products market is without feature and business tends to be a little easier.

MANCHESTER.—Steady or firm price conditions continue on the Manchester market for heavy chemical products and little actual change has occurred during the past week. Caustic soda, soda ash and the other alkali products are all being called for in good quantities against existing orders, and a fair flow of new inquiry for these and other basic requirements has been reported. There has also been a fair inquiry for shippers in respect of expert business. Superphosphates, basic slag and the compound manures are meeting with a steady demand in the market for fertiliser materials, and active inquiry is reported in the tar products market for pitch, creosote oil, carbolic acid and most of the light distillates.

GLASGOW.—The volume of business transacted in the Scottish chemical market during the past week has been much less than expected. This would appear to be the reflection on general business conditions in Scotland, which at the present time are unusually quiet. The demand for laundry chemicals, however, continues to show a steady but slow increase. The call also for chemicals used by manufacturers of rubber materials has been satisfactory. Conditions have been much better in the export market, where the volume of business shows steady increase.

Belgian

LITHOPONE

("Nivaline" Brand)

FOR BRITISH CONSUMPTION

* In order to meet Domestic shortages, we are now able to offer limited tonnages of Belgian Lithopone.

* The qualities produced by our Principals in Belgium were well-known in this country prior to the war and many thousands of tons have been exported to Overseas Markets during the Post-War years.

* Guaranteed 29-30% Red Seal and Fast to Light.

* Available in the Natural or Blued Tones and in Low, Medium and High Oil absorptions.

* The tonnage will, naturally, be limited; therefore, we will endeavour to allocate available supplies as evenly as possible throughout the Trade.

* In the National interest priority will be given to consumers with outstanding Export commitments.

"Nivaline" Lithopone is manufactured by:

PRODUITS CHIMIQUES de NIEUPORT, S.A. NIEUPORT and BRUSSELS

and distributed in the U.K. by their Sole Selling Agents:

GUEST INDUSTRIALS LTD Raw Materials Division

81 2 GRACECHURCH STREET · LONDON · E.C.3

Telephone: Mansion House 5631 (16 lines)
Telegrams: Guestind, Stock, London

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Production of ethers.—British Drug Houses, Ltd., W. Bradley, J. Forrest, and O. Stephenson. June 28, 1946. 613,735.

Welding of aluminium bronze.—Murex Welding Processes, Ltd., and E. C. Rollason. June 28, 1946. 613,737.

Process for extracting an aromatic hydrocarbon from a mixture containing other hydrocarbons.—Universal Oil Products Co. May 20, 1943. 613,770.

Manufacture of maleic acid and maleic anhydride.—British Celanese, Ltd. July 3, 1945. 613,775.

Filters.—Metafiltration Co., Ltd., and J. A. Pickard. July 2, 1946. 613,776.

Phtharocyanine polyhydroxyalkylsulphonamides.—General Aniline and Film Corporation. July 11, 1945. 613,781.

Manufacture of soft glass and composite articles containing said glass.—Corning Glass Works. March 4, 1946. 613,896.

Apparatus for the production of energy by nuclear fission.—Centre National De La Récherche Scientifique. May 2, 1939. 614,386.

Fractional distillation. — Anglo-Iranian Oil Co., Ltd., and M. E. Kelly. May 2, 1944. 614,388.

Production of condensation polymers.—G. W. I. Sheavyn. July 4, 1944. 614,625.

Preparation of polysulphide polymers.—Thiokol Corporation. Oct. 29, 1943. 614,389.

Process for inhibiting the formation of froth in chemical processes.—C. Arnold. (Standard Oil Development Co.). Aug. 31, 1944. 614,626.

Process for drawing out or rolling metals, by means of conjugated rollers.—J. S. Batllori. Nov. 5, 1943. 614,306.

Stabilisation of aqueous anionic dispersions of partially polymerised dimethylol urea.—American Cyanamid Co. Nov. 22, 1943. (Addition to 608,487.) 614,307.

Fractionation applied to petroleum and other hydrocarbon feedstocks.—Anglo-Iranian Oil Co., Ltd. (R. A. King.) April 19, 1945. 614,309.

Evaporating process and apparatus therefor.—J. P. Loumiet. May 25, 1944. 614,312.

Process for the separation of carbonates of magnesium and calcium.—Basic Refractories, Inc. May 8, 1943. (Addition to 573,943.) 614,640.

Processes for the separation of organic nitro compounds.—Imperial Chemical Industries, Ltd., R. G. Franklin, C. W. Scaife, and H. Baldock. July 5, 1945. 614,316.

Austenitic alloy steels.—A. E. Thornton, and C. Stokes. July 9, 1945. 614,398.

Production of bonded laminated materials.—Bakelite, Ltd. Aug. 15, 1944. 614,401.

Process for the removal of wax contaminants from finely divided catalysts used in hydrocarbon synthesis processes.—Standard Oil Development Co. Dec. 28, 1944. 614,406.

Exhaust gas analysis apparatus.—W. M. Zaikowsky. Nov. 22, 1944. 614,633.

Refining of hydrocarbon distillates.—Phillips Petroleum Co. June 16, 1944. 614,636.

Method and device for separation of substances by extraction.—Stavanger Electro-Staalverk Aktieselskabet. Aug. 21, 1944. 614,333.

A device for detecting the unevenness or the variations of the thickness of thread, cord, yarn or like filamentary material.—K. W. Webb. March 11, 1946. 614,430.

Drying rubber latex compositions by treatment with radio-frequency alternating electric currents.—International Latex Processes, Ltd., and W. Binns. March 12, 1946. 614,434.

Methods and apparatus for mixing, rendering plastic and reducing pulverulent materials.—F. B. Dehn (P. O. Abbe, Inc.). April 15, 1946. 614,441.

Method and apparatus for kneading and manufacturing granulated plastic masses.—S.P.A. Lavorazione Materie Plastiche. May 15, 1944. 614,446.

Manufacture by extrusion of large-size tubes from thermoplastics, rubber and the like.—S.P.A. Lavorazione Materie Plastiche. March 28, 1945. 614,447.

Process for dyeing fibres of cellulose ethers and cellulose esters or synthetic nitrogenous materials.—P. May (Sandoz, Ltd.). May 14, 1946. 614,334.

Apparatus for determining initial boiling point of liquids.—W. M. Mercer. Sept. 17, 1945. 614,561.

Oxidation of aliphatic olefinic hydrocarbons.—Petrocarbon, Ltd., V. R. Gray, and H. M. E. Steiner. June 28, 1946. 614,456.

Phthalocyanine heterocyclic sulphonamides.—General Aniline and Film Corporation. July 11, 1945. 614,407.

Manufacture of expanded thermoplastic materials.—Expanded Rubber Co., Ltd., and S. Booth. July 4, 1946. 614,458.

Fluid Control was a PROBLEM in 1742...

From an exhibit in the Science Museum, London

Cast-Iron Stop-Valve for wooden water mains. 18th century

This cast-iron stop-valve was in service from about 1742 on the wooden water main which then supplied the town of Gosport in Hampshire. It was dug up at the junction of High Street with North Cross Street during arterial road drainage work in 1904-5. The valve is of fine workmanship and is fitted with a gunmetal lining—an obvious attempt to prevent undue wear on the plug and to provide ease of operation without leakage.

The principle on which this ancient valve was constructed led, after two centuries of progress, to the invention and development of the Lubricated Plug Valve. In modern industry Audco valves lead the world in the control of fluid, as doubtless this old plug cock did in its day.

AUDCO STANDARD VALVE
Working pressures up to 150 lb. per sq. in.

AUDCO
Lubricated VALVES

MODERN industry needs AUDCO efficiency

AUDLEY ENGINEERING CO. LTD., Newport, Shropshire

Phone : Newport, Shropshire 3245

Production of opaque optical components.—Imperial Chemical Industries, Ltd., C. H. Crooks, and W. A. Greenwood. July 9, 1946. 614,459.

Alloy.—Johnson, Matthey and Co., Ltd., A. R. Powell, and J. C. Chaston. July 11, 1946. 614,349.

Monohydric alcohol esters of α-naphthalene acetic acid and method of producing same.—American Cyanamid Co. Aug. 9, 1945. 614,563.

Manufacture of water-soluble dyestuffs.—Imperial Chemical Industries, Ltd., D. Fysh, A. S. Gomm, and J. C. Harland. July 11, 1946. 614,354.

Manufacture of piperidyl ketones.—Ciba Ltd. July 13, 1945. (Cognate Application 20899/46.) 614,567.

Fully automatic control system for apparatus for thermally treating metal bodies.—Linde Air Products Co. Aug. 28, 1945. 614,575.

Liquid spraying and means therefor.—M. L. White, and S. White (trading as Metal Craft). July 13, 1946. 614,475.

Method of and apparatus for the regeneration of bituminous or tar-containing materials.—J. Groenendijk. Sept. 30, 1943. 614,578.

Preparation of penicillin salts of alkali and alkaline earth metals.—Hoffman-La Roche, Inc. July 19, 1945. 614,581.

Apparatus for the continuous production of magnesium in the liquid state.—R. Fouquet. Dec. 28, 1942. 614,644.

Manufacture of water gas.—Humphreys and Glasgow, Ltd., and I. H. Phillips. July 15, 1946. 614,489.

Welding of aluminium and aluminium alloys.—A.E.R. (1938), Ltd., and C. A. Hunt. July 16, 1946. 614,499.

Manufacture and use of polyazodyestuffs.—Ciba, Ltd. July 26, 1945. (Cognate Application 21277/46.) 614,652.

Articles prepared wholly or in part from polythene compositions.—Imperial Chemical Industries, Ltd., G. P. Lee, and N. D. MacLeod. July 16, 1946. 614,594.

Manufacture and production of artificial filaments, threads, bands and the like.—Courtaulds, Ltd., and A. F. Millidge. July 17, 1946. (Cognate Application 36974/46.) 614.506.

Production of artificial fibres and other articles of modified cellulose and cellulose esters.—American Viscose Corporation. Nov. 23, 1945. 614,659.

Colouration of textile materials.—H. C. Olpin, and T. Jackson. July 17, 1946. 614,600.

Means or apparatus for filtering dust or solid particles from air or gases.—N. Collins, Ltd., and W. L. Gee. July 18, 1946. (Cognate Application 18748/47.) 614,662.

Antibiotic preparation.—C. S. Dillon. July 18, 1946. 614,663.

Catalytic polymerisation of ethylene.—E. I. Du Pont de Nemours & Co. July 18, 1945. 614,515.

Formation of oxide coatings on aluminium surfaces.—Aluminium Co. of America. Feb. 15, 1945. 614,671.

Etching of aluminium surfaces.—March 13, 1944. 614,672.

Production of protein-containing coatings on aluminium surfaces.—Feb. 15, 1945. 614,673.

Coreaction products from drying oils and copolymers of cyclopentadiene and styrene.—Resinous Products and Chemical Co. Nov. 30, 1945. 614,532.

Copolymers of cyclopentadiene and styrene.—Nov. 30, 1945. 614,533.

Manufacture of liquid dispensers.—C. J. Coleman. July 20, 1946. 614,687.

Production of allyl derivatives.—British Resin Products, Ltd., E. M. Evans, and H. Thurston-Hookway. July 23, 1946. 614,538.

Production of polyallyl derivatives.—July 23, 1946. 614,539.

Solvent Recovery Plant

Carbon Adsorption System

British Carbo-Norit Union, Ltd.
14, High Holborn, W.C.1.

"Fullersite" SLATE FILLER

for
BITUMINOUS PRODUCTS, PAINTS, MOULDED RUBBER GOODS, PHARMACY, CERAMIC WARE

apply :—PENRHYN QUARRIES
B.G.F. Adlington, Agent
Port Penrhyn, Bangor

J. M. STEEL & CO., LTD.

LIQUEFIED HYDROGEN CHLORIDE

(HYDROCHLORIC ACID GAS)

Head Office :	*Branch Office :*
"KERNHOUSE," 36/38, KINGSWAY, LONDON, W.C.2.	51, SOUTH KING ST., MANCHESTER, 2

Telephones :

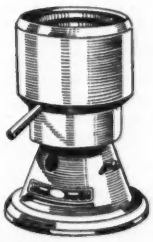
Holborn 2532-3-4-5. *Central 0524.*

MSE LONDON

LABORATORY TYPE CENTRIFUGES

MSE Centrifuges range from the "Minor" with a maximum capacity of 200 ml., to the "Major" which can centrifuge simultaneously up to 4 × 550 ml. cups or 128 × 10 ml. tubes. The MSE "Chemical" model is in stainless steel and is of the continuous action type for dehydration, clarification and recovery of solids up to a cake capacity of 300 ml. Full details of any or all of these British modern laboratory centrifuges on request.

'MINOR'



'CHEMICAL'

MSE "ATO-MIX" *for* BLENDING, EMULSIFYING, DISINTEGRATING

Will blend liquids and cut and pulverise a wide variety of solid and semi-solid substances to an extremely fine consistency, making the preparation of really fine suspensions, emulsions and solutions a quick and simple matter. 12,000 r.p.m. under load. Working capacity up to 1000 cc. Price £18 (plus £4 Purchase Tax in the U.K.). Full details in leaflet No. 130.

MEASURING & SCIENTIFIC EQUIPMENT LTD., 14-28 SPENSER ST., LONDON, S.W.1

CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

Great Possibilities for

QUALIFIED CHEMICAL ENGINEERS

VAST and far-reaching developments in the range of peacetime productions and markets of the Chemical Industry mean that the profession of Chemical Engineering will be of great importance in the future and one which will offer the ambitious man a career of outstanding interest and high status. The T.I.G.B. offers a first-class training to candidates for the Chemical Engineering profession.

Enrol with the T.I.G.B. for the A.M.I.Chem.E. Examinations in which home-study students of the T.I.G.B. have gained a record total of passes including—

FOUR "MACNAB" PASSES

and

THREE FIRST PLACES

Write to-day for the "Engineers' Guide to Success"—free—containing the world's widest choice of Engineering courses—over 200—the Department of Chemical Technology, including Chemical Engineering Processes, Plant Construction, Works Design and Operation, and Organisation and Management—and which alone gives the Regulations for A.M.I.Chem.E., A.M.I.Mech.E. A.M.I.E.E., C. & G., B.Sc., etc.

THE TECHNOLOGICAL INSTITUTE

OF GREAT BRITAIN

219, Temple Bar House, London, E.C.4

SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.

ANALYST required by British Oxygen Co., Ltd., to work at their research station in S.W. London. Duties include development of analytical methods as well as the supervision of general analytical work. Applicants should be between 25 and 30 years of age and possess a first or second class honours degree in Chemistry or A.R.I.C. Apply, **Senior Research Manager, British Oxygen Co., Ltd., Lombard Road, S.W.19.**

AN expanding Middle East Oil Company urgently requires an Assistant Engineer to work initially in the London Office and be willing to accept transfer to the Persian Gulf after one year. Should possess B.Sc. Degee in Chemical or Mechanical Engineering. Will be required to assist in duties involving loading and bunkering facilities, oil gas distribution, and other oil control duties. Some experience of these duties essential. Experience in oil bunkers control with docks operating group of the Royal Engineers may be advantageous. Age 25–30. Salary starting £600-£700 per annum according to age and experience. Write, giving brief details, for application form, and quoting LO 133, to Box "P.Y." c/o J. W. VICKERS & CO., LTD., 7/8, Great Winchester Street, London, E.C.2.

A vacancy exists in a factory in the N.W. for a young man, preferably single, to take charge of a fully mechanised plant for the production of granular materials. The post is suitable for an intelligent person with a mechanical aptitude, ability to handle labour and does not call for a standard of education higher than National Certificate. Salary £400 to £500 per annum. Box No. 2767, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

SITUATIONS VACANT

CHEMICALS, Drugs, Waxes: Energetic Representative required for the Northern Counties by old established firm of Importers. Permanent position. Good remuneration. Apply in confidence, giving details of experience, to Box No. 2766, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

CHEMIST required in metallurgical laboratory in North London to undertake assaying in base metals, ores, concentrates and residues, including tungsten. Give full details, experience and salary required. Box No. 2765, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

ENGINEERS required for Plant Design and works planning, etc., by large manufacturing organisation with works throughout Britain. Applicants should be aged 25/40 with Honours Engineering and/or Corporate Membership of Institute of Mechanical Engineers, have had at least 5 years' practical works experience and held responsible position dealing with the design, manufacture and installation of high pressure gas compressing plants or similar installations. These positions carry with them adequate salaries and excellent opportunities for promotion to the right men. Apply in writing, stating age, qualifications, experience and salary required to Box No. S 7628, A.K. ADVG., 212a, Shaftesbury Avenue, W.C.2.

EXPERIENCED MECHANICAL ENGINEERS are required by the Ministry of Works Engineering Division for service in the **HEAVY RESEARCH PLANT** section.

Applications are invited from suitably qualified engineers to undertake the design, specification and supervision of construction of large engineering installations for new Government research establishments.

The installations are novel in type, of great technical interest and embrance many fields including research plant for general mechanical engineering, aeronautics, hydraulics, ship testing, combustion, heat transfer, and turbine development. There is considerable scope for technical and executive ability.

Vacancies exist for posts of Engineer in the scale of £750 to £1,000 per annum ref. C.74/49A and of Assistant Engineer in the scale of £475 to £750 per annum (consolidated London rate), ref. C.75/49A. Appointments will be made according to age and experience.

Candidates should be Corporate Members of the Institutions of Mechanical or Civil Engineers and preferably should hold a good engineering degree.

Experience in one or more of the fields of mechanical engineering stated below will be an advantage but sound basic training in heavy mechanical engineering and ability to handle novel problems are of primary importance.

1. Design, layout and installation of medium and large machinery, both static and rotating.
2. Layout and installation of large turbo and reciprocating air compressors or hydraulic plant involving large diameter pipe work.
3. Planning and execution of gasworks, chemical or petroleum refinery installations involving pressure vessels and pipework and including welding and industrial radiography.
4. Theoretical investigations of a mathematical nature and involving knowledge of basic properties of engineering materials applied to complex structures, power transmission systems, pressure vessels, fluid flow, heat transfer or vibration. Theoretical ability must be allied to works experience.

The appointments are in London and are temporary posts but the projects concerned have long term possibilities and competitions are held periodically to fill established vacancies.

Write quoting appropriate reference number to the **MINISTRY OF LABOUR AND NATIONAL SERVICE, TECHNICAL AND SCIENTIFIC REGISTER, (K), YORK HOUSE, KINGSWAY, W.C.2.** for application form which must be completed within 10 days of the appearance of this advertisement. 1.2.A.1 (120)

SITUATIONS VACANT

SENIOR Draughtsman required for chemical works. Applicant should be 30 to 40 years of age, having a high standard of drawing skill and experience of chemical works, and be capable of collaboration with technical staff for the design and layout of new chemical plants. Applicants should state age, full details of training and experience, and salary required, to WORKS MANAGER, John Nicholson & Sons, Ltd., Hunslet Chemical Works, Leeds, 10. (By permission of the Ministry of Labour and National Service, under the Control of Engagement Orders, 1947 and 1948.)

THE British Oxygen Company Ltd., require urgently for their headquarters staff, highly trained draughtsmen aged 25–40, men who have obtained their higher National Certificate in Mechanical Engineering, and who have had practical experience in the preparation of chemical works lay out drawings and site drawings (knowledge of high pressure gas plant lay out an advantage), should apply in writing to the **Personnel Dept., at Grosvenor House, Park Lane, London, W.1.**

WORKS Chemist required for radio valve factory in London area. Age 25–35. Degree in chemistry essential and experience in chemical analysis and process control in valve industry desirable. Salary commensurate with qualifications and experience. Box No. 2768, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

FOR SALE

BLAIR CAST-IRON SINGLE ROLLER DRUM DRIER, with 2 ft. 6 in. diam. by 7 ft. 3 in. long drum fitted into cast-iron vacuum tight casing. Complete with Crofts variable speed gear, 12½ h.p. motor and liquid feed pump.

SIMON TWIN ROLLER DRUM DRIER, with steam-heated rolls, 2 ft. 4 in. diam. by 5 ft. long; drive through spur gearing with countershaft and complete with fast and loose pulleys.

DITTO by "Milne."

BROADBENT 48-in. SUSPENDED TYPE HYDRO EXTRACTOR, overdriven from 15 h.p. motor, 400/3/50 supply, together with Pony motor for slow running.

BROADBENT 48-in. HYDRO EXTRACTOR, with 48-in. galvanised iron basket, complete as above.

JOHNSON TIMBER PLATE AND FRAME FILTER PRESS, 28 plates and 29 frames, cakes 2 ft. 1 in. sq. by 1½ in. closure. (Two available.)

18-in. diam. WILKINSON OINTMENT MILL, with marble refining discs and enamelled hopper and agitator, and complete with driving motor.

TUNGSTONE ACID PUMPS. A number available in Ebonite, Bronze and Tufnol.

SILICA COILS of 2½ in. bore, comprising 60 ft. formed into seven turns at 2 ft. 6 in. diam., complete with teak supporting framework. (Brand new.)

NEWMAN INDUSTRIES LIMITED,
YATE, BRISTOL.

ROTARY VACUUM FILTER

Drum cell type. 4 ft. 7½ in. diameter × 2 ft. 7½ in. wide. Filter surface 35 sq. ft. 2 h.p. 4-speed motor with starter. Makers, International Combustion Co, Ltd. Brand new condition £1,350

RYLATT & CO.,
64 Fountain St., Manchester
TELE: BLACKFRIARS 9956

FOR SALE

GEORGE 600 COHEN'S

ONE Johnson Wood plate and frame **FILTER PRESS,** plate size, 12 in. by 9 in. cake size, 8 in. by 5 in. by ⅝ in., ¾ in. enclosed feed and outlet.

One horizontal **TROUGH MIXER,** 18 in. wide by 9 in. by 25 in. deep, with gate type agitator. Driven by fast and loose pulley through machine cut gears, two speed machine, arranged for hand tilting, 4 h.p. Higgs motor to drive.

One Werner Pfleiderer type **TROUGH MIXER,** approx. 2 ft. 10 in. long 2 ft. 3 in. wide by 2 ft. deep, twin "Z" blade agitators. Driven by 28 in. diam. by 4 in. face fast and loose pulleys, hand lever tilting.

One Wilkinson 18 in. **OINTMENT MILL,** with enamel hopper, 18 in. diam. by 12 in. deep, underdriven through bevel gearing and 12 in. diam. by 3 in. face fast and loose pulleys.

One Size 7 duplex **MIXING & KNEADING MACHINE** by Morton, steam jacketed, trough size approx., 42 in. by 38 in. by 30 in. Working capacity 115 galls. Fitted twin gunmetal mixing blades double Naben type. Suitable for int. working pressure of 15 lb. p.s.i. or high vacuum. Forward and reversing pulleys.

One direct electrically driven **HYDRO EXTRACTOR** of pitless type by Broadbent, 42 in. diam. by 16 in. deep galvanised perforated basket.

One unused Mitchell Shanks centrifugal **Acid Pump,** vitreon lined, size and type MS.5/160, 2½ in. diam. suction, 2 in. diam. delivery. Delivery head 33 ft./26 ft.

One Vacuum **EVAPORATING PLANT,** by Morton, comprising tinned copper pan approx. 8 ft. overall depth by 5 ft. int. diam. Steam jacketed. Evaporator cap. 300 galls. p.h.

One unjacketed horizontal **TROUGH MIXER** by Young, approx., 6 ft. by 2 ft. by 2 ft., Scroll type agitator fast and loose pulley driven.

GEORGE COHEN SONS & CO. LTD.
SUNBEAM ROAD, LONDON, N.W.10.
Tel.: Elgar 7222 and
STANNINGLEY Nr. LEEDS
Tel.: Pudsey 2241.

BOILER STORAGE TANKS
Excellent condition
3. 28′ × 7′ 6″ diam.
2. 30′ × 7′ 0″ diam.
1. 30′ × 8′ 6″ diam.
CAST IRON SECTIONAL TANK
20′ × 8′ 6″ × 10′ deep.
Capacity 16,000 galls.

MADEN & McKEE LIMITED,
317 Prescot Road,
Liverpool, 13.

NEW STAINLESS STEEL PLANT FOR ALL NEEDS

with quick delivery

Boiling Pans, Tanks of all shapes and sizes
Dyeing and **Drying Racks**
Stainless Steel Buckets
Steam heated vacuum Driers
Acid resisting enamelled ware

We also specialise in finding unusual second-hand items for our customers. If you do not receive our Monthly List please let us have your address. We are not dealers but sell plant on commission. May we help you?

R. F. PAGET Ph.D., C.C.I.
Chemical Engineer
Manor House, Barwick-in-Elmet, Leeds
Tel. Barwick-in-Elmet 216

FOR SALE

MORTON, SON & WARD LIMITED,
—OFFER—

ONE—21,000 g.p.h. against 52 ft. head Vacseal Vulcanite Lined Centrifugal Acid Pump, direct coupled to 15 h.p. E.E.C. enclosed motor with oil immersed Ellison starter.

TWELVE—2,000 g.p.h. against 60 ft. head Mopumps, cast iron bodies, gunmetal impellors, direct coupled to 3 h.p. Brook motors, with starters, 400/3/50 cycles, together with complete set fittings and spares, tools, etc. (New and unused.)

FOUR—4-pot stainless steel ball Grinding Mills with two containers, 1 ft. 2 in. diam. by 1 ft. 3 in. deep and two 9 in. diam. by 10 in. deep, driven through vee ropes from new 2 h.p. Laurence Scott motors, 400/3/50 cycles.

ONE—New "Morward" Powder Mixer with trough, 6 ft. long by 2 ft. wide by 2 ft. deep, driven through gearbox from 5 h.p. motor, 400/3/50 cycles.

ONE—New and unused Gardner "Rapid" steam jacketed Mixer and Dryer, 6 ft. long by 2 ft. 3 in. wide by 2 ft. 6 in. deep, gearwheel and pinion from fast and loose pulleys.

MORTON, SON & WARD LIMITED,
WALK MILL, DOBCROSS, Nr. OLDHAM, LANCS.
'Phone-Saddleworth 437

CHARCOAL, ANIMAL and VEGETABLE, horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams, "Hill-Jones, Bochurch, London." Telephone: 3285 East.

CHRISTY & NORRIS 8" Grinding Mill, complete with Motor Stand, and improved Feeding Hopper. Stephenson, Woodside, Claverdon.

DISINFECTORS. Two 8 ft. by 5 ft. diam. jacketed, Four 7 ft. by 3 ft. diam. with coils, Two Oval 50 in. by 30 in. by 7 ft. jacketed. New condition. THOMPSON & SON (MILLWALL) LTD., Cuba Street, London, E.14. Tel. East 1844.

EXCELLENT STEEL FRAMED BUILDINGS FOR SALE

1—77 ft. long by 33 ft. wide by 80 ft. high.
1—51 ft. long by 33 ft. wide by 80 ft. high.
1—140 ft. long by 40 ft. wide by 17 ft. high to 40 ft. high.
Inspection by arrangement.

MADEN & McKEE LIMITED
317, Prescot Road,
Liverpool, 13.

SECTIONAL timber framed buildings, 18 ft. wide, 24 ft. to 120 ft. long. All reconditioned, reglazed and repainted. Outside walls of asbestos on plasterboard. New plasterboard lining for walls and roof. New asbestos roof cover. All deliveries per road.
WILLIAM R. SELWOOD, CHANDLER'S FORD, Nr. SOUTHAMPTON.
Tel.: Chandler's Ford 2275.

'Phone 98 Staines

SET of Rubber or Plastic Rolls, Steam Heated, 16" by 9" dia.
Artofex Dough Mixer, 34 in. revolving bowl, electric driven.
Unused "Weir" Tubular Condenser, 140 sq. ft.
Jacketed Cylindrical Vacuum Oven, 7 ft. by 3 ft. (unused).
3 ft. 6 in. stainless coated Edge Runner by Torrance.
Filter Press, 30 chambers, 26 in. by 26 in.
HARRY H. GARDAM & CO. LTD.
STAINES

50 New Dewrance Pressure Gauges, 5-in. dial by 700 lb. Bakelite Cases by ½ in. fitting. Each at 15s. nett ex-works. THOMPSON & SON (MILLWALL), LTD., Cuba Street, Millwall, E.14. Tel.: East 1844.

FOR SALE

SEVERAL small steam-jacketed Copper Pans.
Several Ball Mills, 6 ft. 6 in. by 6 ft. 8 in., Silex-lined batch type, with driving gear and clutch.
3 Simon type Portable Slat Conveyors, 20 ft. long, for boxes or bags.
Mixing Pan, 6 ft. dia. by 5 ft. deep, flat bottom, open top.
Ditto, 3 ft. dia. by 5 ft. deep, flat bottom, open top.
2—6 in. Centrifugal Pumps by Cherry.
Vertical cross tube Boiler 80 lb. pressure, 7 ft. 6 in. by 8 ft. 6 in.
Milton Grinders fitted with 30 in. vertical stones, belt driven with shaker feeds.
1 Iwel 20 in. Turbine Centrifugal Extractors with spare baskets.
Steam Jacketed Gardner pattern Mixer about 30 gallons capacity.
4 vertical Hall Ammonia Compressors, single cylinder, belt driven cylinders 3 in. to 5 in. bore.
3 Alfa-Laval Disc Separators, belt driven, size 45 and 65, with chambers 12 in. and 15 in. dia.
2 unused belt driven Ram Pumps, fitted one ram 1¼ in. dia., 3 in. stroke, brass fitted.
Alpine type Perplex Grinder, chamber 20 in. dia.
Ditto similar, chamber 18 in. dia.
Single pair toothed Crushing Roll, belt and gear driven, last used for soap crystals.
2 Steam Jacketed Mixing Pans.
Several A.C. motors, 3–10 h.p.
2 Jacketed Mixing Pans with agitators.
21—3 gallon capacity Ball Mills.
4 Mather & Platt Colloid Mills.
500 ft. B.B. Gravity Conveyor, steel rollers, 14 in. long by 6 in. pitch
Torrance Positive-geared Edge Runner Mill.
Torrance Combination Mill, comprising edge runner, horizontal pug, and granite roller mill.
5 Riveted Vessels, partly jacketed and plain, with agitators and coils, as used in oil-refining trade.
Sale about 126 ft. of 10 in. Continuous Worm Conveyor complete in steel box, with intermediate bearings and geared drive at one end.

Write: RICHARD SIZER LIMITED, ENGINEERS
CUBER WORKS, HULL

STORAGE TANKS. EQUAL NEW
2 Welded Steel Tanks, 20 ft. by 10 ft. by 10 ft. ¼ in. plate, closed top, valves, gauges, inspection ladder. Low level float alarm. Each 12,500 gallons.
MADEN & McKEE LIMITED
317 Prescot Road,
Liverpool, 13.

1000 STRONG NEW WATERPROOF APRONS. To-day's value 5s. each, Clearing at 30s. dozen. Also large quantity Filter Cloths, cheap. Wilsons, Springfield Mills, Preston, Lancs. Phone 2198.

WORKING NOTICES

THE Proprietor of British Patent No. 474228, entitled "Froth Flotation Treatment of Sylvinite Ores," offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to SINGER, EHLERT, STERN & CARLBERG, 28 E. Jackson Blvd., Chicago 4, Illinois, U.S.A.

THE Proprietor of British Patent No. 530727, entitled "Solvent treatment of partially polymerised oils to obtain drying and non-drying oils" offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to, SINGER, EHLERT, STERN & CARLBERG, 28 E. Jackson Blvd., Chicago, 4, Illinois, U.S.A.

THE Proprietor of British Patent No. 566653, entitled "Processes for the synthesis of pyrazinemonocarboxylamide," offers same for license or otherwise to ensure practical working in Great Britain. Inquiries to SINGER, EHLERT, STERN AND CARLBERG, 28, East Jackson Boulevard, Chicago 4, Illinois, U.S.A.

SERVICING

GRINDING, Drying, Screening and Grading of materials undertaken for the trade. Also Suppliers of Ground Silica and Fillers, etc. JAMES KENT, LTD., Millers, Fenton, Staffordshire. Telegrams: Kenmill, Stoke-on-Trent. Telephone: 4253 and 4254, Stoke-on-Trent (2 lines).

GRINDING of every description of chemical and other materials for the trade with improved mills.—THOS. HILL-JONES, LTD., "Invicta" Mills, Bow Common Lane, London, E. Telegrams: "Hill-Jones, Bochurch, London." Telephone: 3285 East.

LONDON FIRM offers complete service packing powders of all descriptions, also liquids and chemicals. Long runs only. Containers and packing cases for home and export, made on premises. Near to docks. Own rail sidings. Box No. 2331, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

SPECIAL Machines—designed and made by R. A. COLLACOTT & PARTNERS, 70 Victoria Street, London. S.W.1, (VICtoria 0179/9771).

PATENTS & TRADE MARKS

KING'S PATENT AGENCY, LTD. (B. T. King, A.I.Mech.E., Patent Agent), 146a, Queen Victoria Street, London, E.C.4. ADVICE Handbook, and Consultation free. Phone: City 6161.

INDUSTRIAL RUBBER BOOTS *REPAIRED*

Replacements are still difficult to obtain, so give your rubber boots added life by sending them for complete repair and rebuilding by Timpson craftsmen, using special vulcanising process. Leather soled rubber boots also repaired.

- Large quantities handled quickly.
- Send sample pair for trial.
- Special quotations for the trade and industrial users

When despatching, please

1 Include delivery note showing your address and number of pairs sent.

2 Label each boot carefully, stating repairs required, and also your name and address. A tie-on label is best.

TIMPSON
FOOTWEAR REPAIR SERVICE
WALKRIGHT HOUSE
1 DERBY STREET - MANCHESTER 8

1 CWT. KEGS
—7 DAY DELIVERY—

COOPERED IRON HOOPED KEGS SUITABLE FOR DRY MATERIALS MEASURING 13" X 22"

DESIGNED AND MANUFACTURED BY US SPECIALLY FOR THE HOME & EXPORT CHEMICAL TRADES.

Sample on request

GEO. W. ORR & Co. Ltd.
8 COUSTONHOLM ROAD, GLASGOW, S.3.
Telegrams: Containers, Glasgow. Telephone: Langside, 1777.

Drying Trays

- IN HARD RESISTANT VITREOUS ENAMEL
- SPECIALLY PROCESSED TO GIVE MAXIMUM SERVICE
- ALL CORNERS AND EDGES ROUNDED
- SIZES TO SUIT CUSTOMERS REQUIREMENTS
- FINISHED IN GREEN OR OTHER SELECTED COLOUR

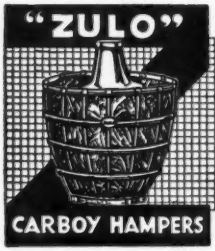
NATIONAL ENAMELS LTD.
53, NORMAN ROAD, GREENWICH
LONDON, S.E.10.
Telephone: Greenwich 2266-7 and 2429

Acid Resisting Vacuum
EJECTORS
Steam or Water operated for all Filtration, Evaporation or Distillation Plants.
Lennox **Foundry Co. Ltd.**
Glenville Grove, London, S.E.8
Specialists in corrosion problems

HYDROGEN PEROXIDE
Concentrated Qualities Dyestuffs & Chemicals
COLE & WILSON, LTD.
24, Greenhead Road, HUDDERSFIELD
Phone: Huddersfield 1993. Grams: 'Colour' Huddersfield

TRIBASIC PHOSPHATE OF SODA
Free Running White Powder
Price and sample on application to :
PERRY & HOPE, LIMITED, Nitshill, Glasgow

BROWN & CO.
PACKING CASE MANUFACTURERS,
JOINERS AND WOOD TURNERS.
Estimates given, including Packing, Freight Insurance, and all Charges port to port.
73 to 85 McALPINE STREET, GLASGOW, C.2.
Phone : 6566 Central (3 lines) ESTABLISHED 1870 Grams : "Boxes, Glasgow"



LEIGH & SONS METAL WORKS
Orlando St.
BOLTON.

THE "TEANTEE" STANDARD PORTABLE CONVEYOR
FIXED & PORTABLE CONVEYORS, FABRICATED STEELWORK ETC.

14in. belt 25ft. crs. Suitable for a wide variety of materials
T. & T. WORKS LTD
Phone : BILLESDON 261
BILLESDON, LEICESTER

WOOD & FAIRWEATHER
SUCCESSORS TO
RICHARD HOYLE & Co.
FOR
BLACKS
which have stood the test of time.
NEWCASTLE-UPON-TYNE
ESTABLISHED 1766

The World's Greatest Bookshop
FOYLES
FOR BOOKS
FAMED FOR ITS EXCELLENT TECHNICAL DEPT
New & secondhand Books on every subject.
Stock of 3 million volumes.
We BUY Books, too
119-125 CHARING CROSS RD LONDON WC2
Gerrard 5660 (16 lines) & Open 9-6 (inc Sat)

CONSISTENT
PURITY, STRENGTH AND QUALITY
POSTLIP
MILL 633
Filter Papers
EVANS, ADLARD & CO. LTD • WINCHCOMBE • GLOS.

CARBOY HAMPERS

Safety Crates Packed Carboys

"VULCAN" BRAND

HARRIS (LOSTOCK GRALAM) LTD.

Lostock Gralam Northwich

Telephone:
2217 (2 lines) NORTHWICH
Telegrams:
"VULCAN" LOSTOCK GRALAM

COPPER PLANT

for the CHEMICAL TRADES

Large Steam jacketed copper boiling and mixing pan with geared agitators, steam jacket of mild steel

STILLS
RECTIFYING COLUMNS
CONDENSERS

Autoclaves
Calandrias
Vacuum Pans
Boiling Pans
Pipework, Coils, etc.

BLUNDELLS &
T. ALBERT CROMPTON & Co. Ltd.
WEST INDIA DOCK RD., LONDON, E.14
Phone: East 3838 (3 lines) Grams: Blundell, Phone, London
ESTABLISHED 1825

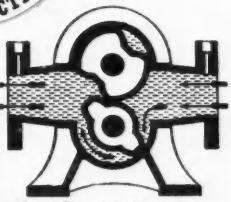
CONSTRUCTIONAL ENGINEERING
FOR
THE
CHEMICAL INDUSTRY

STRUCTURAL STEELWORK STEEL CHIMNEYS ETC.

RIVETTED & WELDED STEEL PLATE FABRICATIONS ETC

B. GETHINGS & SON
BOROUGH ENGINEERING WORKS
HARE STREET • BILSTON
Phone: BILSTON 41325
Grams: 'GETHINGS,' Bilston

SIMPLE POSITIVE CONTINUOUS
WITH HIGH SUCTION LIFT



Sizes from ¼ inch upwards to handle 150 galls. to 250,000 galls. per hour.

"Drum" Rotary Piston Pumps will pump thick or thin liquids and are efficient at high or low speeds and with any form of drive. The action of the revolving piston gives a positive continuous flow without pulsations. There are no valves. Pumps can be steam jacketed if required.

The revolving piston gives a continuous flow without pulsation, churning or forcing through small passages—this feature is particularly useful for emulsions or suspensions whose equilibrium is not thereby disturbed

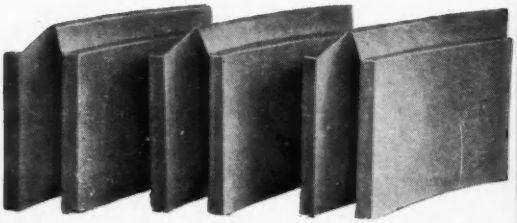
Manufacturers of the

DRUM ROTARY PISTON PUMP

THE DRUM ENGINEERING CO. LTD.
HUMBOLDT STREET, BRADFORD
London Office: 38, Victoria Street, Westminster, S.W.1

C.A.1

For Maximum Resistance-



"NORI"
ACID RESISTING
WARE

Exceptionally prolonged service is assured when Tanks, Towers, Scrubbers, etc. are lined with Accrington "Nori" Ware.

Impervious to acids and most other chemicals.

Data and Estimates on request.

ACCRINGTON BRICK & TILE CO.
LTD.
ACCRINGTON
Phone - - Accrington 2684

HYDROFLUORIC ACID

ANHYDROUS AND SOLUTIONS ALL STRENGTHS
ALSO PURE REDISTILLED 40% w/w

FLUORIDES, Neutral
Sodium, Magnesium, Barium, Potassium, Lead, Zinc, Ammonium, Aluminium, Lithium, Chromium.

BiFluorides (Acid)
Ammonium, Sodium, Potassium.

Double Fluorides (Cryolites)
Sodium HexafluoAluminate
Potassium HexafluoAluminate

SILICOFLUORIDES
Magnesium, Zinc, Ammonium, Barium, Potassium, Lead, Hydrofluosilicic Acid.

BOROFLUORIDES
Sodium, Potassium, Ammonium, Lead, Copper, Zinc, Cadmium, Fluoboric Acid Solution.

OTHER FLUORIDES TO SPECIFICATIONS.

Glass Etching Acids
Ammonia White Acid and VITROGRAPHINE.

JAMES WILKINSON & SON, LTD.

TINSLEY PARK ROAD, SHEFFIELD, 9
'Phone 41208/9 'Grams "CHEMICALS" Sheffield

Printed in Great Britain by THE PRESS AT COOMBELANDS, Ltd., Addlestone, and published by BENN BROTHERS LTD., at Bouverie House, 154, Fleet Street, E.C.4, 12 February, 1949. Registered at the General Post Office. Entered as Second Class Matter at the New York, U.S.A., Post Office.